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VESICANT CHEMICAL WARFARE AGENTS*

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The chemical warfare agents, usually called the vesicant or blister gases, have as their primary toxic action irritation of the skin and mucous membranes. Those that have proved effective are not gases but volatile liquids and derive a large part of their tactical value from the fact that, due to their physical state, they may remain and continue to produce casualties in a populated area for hours or weeks, depending on the conditions of weather and terrain.

These substances may be distributed over an area by shell fire, aerial bombing, or by spraying from low-flying aircraft. The last method would be by far the most effective one if weather and anti-aircraft defenses should permit.

The objectives of attack on the civilian population by chemical agents would be to damage morale, create panic, force evacuation, produce casualties, disorganize industry, and break lines of communication and transport. The "vesicant gases," due to their persistency, would be particularly effective in forcing evacuation of vital industrial areas for extended periods and in disrupting lines of communication and transport. They would also be of great value in contaminating water and food supplies.

Only two substances in this class, mustard gas and lewisite, have proved effective in the field up to this time, but there can be no reasonable doubt that others are ready for use. Indeed, we have already been officially informed that by judicious tinkering with the molecule of mustard gas a group of substances called nitrogen mustards have been developed that vary in their physical properties from very light liquids, five times as volatile as mustard gas, to solids with low melting points, and that their toxicological properties are essentially similar to those of their prototype.

Mustard gas, a German invention, is B B′—dichlordiethyl sulfide, $(ClCH_2CH_2)_2S$. It is an oily liquid which freezes at 14° C. (57° F.), boils at 228° C. (442.4° F.), and is similar in appearance to used cylinder oil. It vaporizes readily at ordinary temperatures, giving off an odor similar to that of mustard or horseradish, and its vapor density (5.4) is such that the vapor is also actively vesicant. It will persist in an area from five days to three weeks in ordinary weather (much longer in very cold weather). It hydrolyzes slowly but leaves no toxic products behind.

Lewisite, an American contribution, is bichlorvinyl-dichlorarsine ($ClCH:CHAsCl_2$). It is also an oily liquid, does not freeze at ordinary temperatures, boils at 190° C., and is therefore a better winter gas than mustard. It has an odor similar to that of geraniums and its vapor (density 7.1) is actively vesicant. It will persist in an area for from 24 hours to one week in ordinary weather. It hydrolyzes readily but the products of this hydrolysis are arsenical substances that are also vesicant and may remain in the area for an indefinite period unless washed away by rain.

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All of the vesicant agents have the property of penetrating any porous material such as fabrics, felts, leather, unglazed brick, and wood. They also penetrate rubber though quite slowly.

The essential difference between mustard gas and lewisite lies in the fact that whereas the products of decomposition of mustard gas are harmless those of lewisite are arsenicals that are not only vesicant agents but also systemic poisons. The nitrogen mustards, likewise, hydrolyze rather readily, as does lewisite, and the products of hydrolysis are also toxic.

In general, it may be stated that the differences between the various known vesicant agents are far less marked and less important than are their similarities. Since it is extremely likely that in any attack these agents will be used in mixtures and that their odors will be masked to make detection difficult, it is safest and least confusing to think of them as a group rather than as individuals.

TOXIC ACTION

The damage produced by these agents is a function of the concentration of the agent and the duration of the exposure. Thus, exposure for a short time to a light concentration of the vapor will cause no damage at all, whereas a splash of the liquid left on the skin until it is absorbed will produce massive necrosis before a blister can form. Exposures to various concentrations and for various times may produce all degrees of injury between these extremes.

LATENT PERIOD

All of the vesicant agents have a latent period between the exposure and the development of symptoms. This latent period is relatively short when the exposure is severe, and long when the exposure is slight. It varies from fifteen minutes after severe exposure to lewisite to six hours after slight exposure to mustard gas. This fact adds greatly to the tactical value of the agents, for the victims may not realize that they have been gassed until it is too late for the effective use of prophylactic measures.

ABSORPTION

All of these substances are rapidly absorbed by animal tissues and after the lapse of five minutes they have penetrated so deeply that little is to be gained by attempts to remove or neutralize them. This does not apply, of course, to such part of the agent as may remain in the victim's clothing.

SUSCEPTIBILITY OF TISSUES

The severity of the effect of the vesicants on various tissues varies very widely. The eye is most susceptible, the skin second, and the upper respiratory tract third. It is probable that the respiratory tract would be more readily injured than the skin if it received equal exposure but since only the vapor is usually inspired less damage is done to the respiratory tract than to the skin, which is exposed to spray, droplets, and splashes.

PATHOLOGY

The skin: The lesions produced on the skin may vary from a simple erythema to deep necrosis. The typical effect resembles a second degree burn, being a vesicle surrounded by an area of erythema. Splashes or large drops may produce a gray slough surrounded by an annular vesicle. Deep necrosis may also occur under the vesicles, for the action of the chemical may progress for as long as three days. This necrosis may extend down to the fascia. The pathological process is quite similar to that seen in the thermal and chemical burns that we see in civil practice except for the tendency to progress for hours or days. The thin skin on the neck and that in the folds of the axilla, the scrotum, and the vulva is especially susceptible. Absorption of arsenic from lewisite may produce arsenic poisoning. The deep burns are very slow to heal and are peculiarly susceptible to infection.

The respiratory tract: The lesions produced in the upper respiratory tract are entirely similar to those seen in the skin. The larynx and trachea are usually the worst sufferers and the bronchioles and vesicles commonly escape injury. Severe exposure of the respiratory tract may cause a violent laryngitis and tracheitis which in

some instances may be ulcerative. Bronchopneumonia is a common sequel, due to secondary infection, and is the chief cause of death from vesicant agents. There is no sound evidence that either tuberculosis or bronchiectasis are sequelae.

The eyes: The eyes are more susceptible to injury than are other exposed tissues. Concentrations of vapor insufficient to produce skin burns may affect the conjunctiva and the cornea. The damage may be divided into three grades:

1. Hyperemia and edema of the conjunctiva, with little or no corneal reaction.

2. Severe hyperemia and edema of conjunctiva, with roughening of cornea and some loss of epithelium. All damage superficial to Bowman's membrane. A mild iritis may develop, and miosis is usually a feature.

3. Severe injury to both cornea and conjunctiva. The conjunctiva may appear white at first, due to coagulation, but extreme edema and congestion follow, and some necrosis may develop later. The superficial layers of the cornea are destroyed and the damage may extend through all layers. In such cases, perforations of the eye may ultimately occur. Miosis occurs regularly and iritis is severe. Some degree of permanent scarring of the cornea is almost invariable in this group. This very violent type of reaction seldom if ever results from exposure to the vapor alone. It is usually the result of the liquid itself splashing or spraying into the eye.

In the last war the British found that 75 per cent of the eye injuries were in the first group, 15 per cent in the second, and 10 per cent in the third.

Systemic effects: The vesicant agents produce no systemic effects except after very severe exposure. Arsenical agents such as lewisite may produce arsenical poisoning under such circumstances but it is unlikely that this will be seen often. Severe exposure to the nitrogen mustards produces, in experimental animals who survive for several days, a leukopenia which may progress to an agranulocytosis. The red blood cells are not damaged. Massive doses produce severe damage to the bone marrow which may progress to complete destruction of the blood-forming elements before death occurs. In such cases a hemorrhagic necrosis of the basal ganglia may also take place if death is long delayed.

It should be remembered that the above systemic effects occur only after massive doses far greater than are likely to be experienced under field conditions. The danger to life from the vesicant agents is not great and is due almost entirely to secondary infection of the lesions rather than to the local or systemic effects of the chemical agents per se.

SYMPTOMS

There is nothing specific about the symptoms produced by the "blister gases." Any experienced physician could predict the symptoms from the pathologic effects enumerated above. Pain is somewhat less severe than would result from comparable lesions produced by flame or steam. Severe exposures that produce extensive skin lesions result in the development of surgical shock but this is likely to be somewhat less severe in proportion to the area involved than would result from a thermal burn. Fever is slight unless secondary infection develops. It must be kept constantly in mind that neither the signs nor the symptoms appear until an hour or more after the exposure.

PROPHYLAXIS AND FIRST AID

Prophylaxis is the best treatment and this should include both prevention of contamination and first aid. "The best first aid is self aid." Those persons not required to be outdoors in the protective services should stay inside with the doors and windows closed to avoid the liquid agents. They should go upstairs if possible to avoid the concentrated vapor, which, being heavy, clings to the ground and rarely reaches an effective concentration as high as the second floor. Above all, they should avoid cellars, ditches, and other areas below the surface of the ground, for in such places the gases tend to collect and remain for long periods. If these precautions are observed, gas masks and protective clothing are unnecessary.

Those who are caught outdoors without masks or protective clothing should observe the same precautions that they would in a heavy rain. Hats, umbrellas, raincoats, and overshoes will not protect the individual completely nor for a very long period but they will minimize the amount of contamination and thus prevent anything more serious than a severe sunburn, in most instances. If the individual has eyeglasses, he should by all means put them on, and if the chemical is being distributed from airplanes he must, above all things, curb his curiosity and not look up. Drops of the liquid agent in the eyes are far more dangerous than is the vapor. A wet handkerchief over the face gives considerable protection from droplets. He should lose no time in getting under a roof if one is nearby. If he can get into a closed house, so much the better, but he should leave all contaminated clothing outside, preferably in a covered garbage can. He should then wash himself thoroughly with running water and laundry soap. The eyes should be freely flushed with plain tap water or a 2 per cent solution of bicarbonate of soda. If the soda solution is not already made up and readily available, it is much better to use plain water, for if the agent is not washed from the eyes in five minutes it is absorbed and the damage is done. After five minutes no irrigation should be used at all, for more harm than good will result. Similarly, it is better to wash the skin with water and laundry soap at once than to use the best chemical antidote five minutes later. Water and alkalies such as laundry soap will remove or destroy any of these agents if used promptly and must be considered the most valuable of all antidotes because of their availability and universal applicability. There are somewhat better specific chemical antidotes for both mustard gas and lewisite, but in most instances the individual will not know what gas has been used in time to select a specific antidote even if it were readily available, which is exceedingly unlikely to be the case.

Those in the protective services will be provided with protective clothing and gas masks. These gas masks will protect against all known vesicant agents. The protective clothing will protect for a considerable time against any ordinary concentration of the gases. These individuals will probably also be provided with a special protective ointment and other chemical neutralizing compounds and will be specially trained in their use.

If a gas raid should occur, it seems obvious that every able-bodied citizen must take care of himself, for no organized decontaminating program can be carried out within the critical five minutes, and also any attempt at mass decontamination would cause many panicky persons to rush into the streets and thus contaminate themselves still more during the time that could more profitably be spent in their own bathrooms. Riots would probably take place at the decontaminating stations, making it impossible to care for those who were unable to take care of themselves.

Persons who were injured during a raid would not be able to take care of themselves so special provision must be made for them. It must be borne in mind that most of these individuals would inevitably be burned to some extent for it would not be possible to reach them within five minutes after the exposure. When they were reached, however, all excess liquid should be removed or neutralized and all contaminated clothing removed in order to prevent further damage that would be done to the victims themselves or to other persons with whom they might come in contact. If a contaminated individual should be carried into a casualty station or a hospital this would result in the "gassing" of attendants and other casualties as well. Stretcher squads and ambulance teams as well as cleansing stations will probably be equipped with a special protective ointment which will protect against both mustard gas and lewisite. This ointment neutralizes mustard gas but protects only temporarily against lewisite and the nitrogen mustards, so it should be washed off as soon as the opportunity presents itself. Cleansing stations will be provided to carry out complete decontamination of casualties. They will use spe-

cific neutralizing agents followed by soap and water. The most effective neutralizing agents for mustard gas are the various hypochlorites such as bleaching powder, "hychorite," or Dakin's solution. They will also irritate the skin and must themselves be washed off, so are not well suited for use by stretcher teams. The best neutralizing agents for lewisite are the peroxides, such as hydrogen peroxide. Alkalies, including alkaline laundry soaps, are effective against all known vesicant agents. A 10 per cent solution of sodium hydroxide in glycerine is highly recommended but glycerine is scarce at present.

It is extremely important to remember that none of these neutralizing agents should ever be used in the eye. This warning applies to hydrogen peroxide, which is recommended for eye irrigation in one of the early Civilian Defense manuals. If a liquid agent has entered the eye and the patient is seen within five minutes, the eye should be freely but not forcefully irrigated with plain water or a 2 per cent solution of sodium bicarbonate. After five minutes, no irrigation of any kind should be used.

When contamination is caused by vapor alone there is nothing to remove, for the agent has already been absorbed; consequently, there is no first aid problem involved.

TREATMENT

The treatment of injuries caused by the vesicant gases, like their pathology, is non-specific, but a few points deserve mention.

The eyes: Irrigations for eye injuries were, until recently, highly recommended, but later observations have shown that better results are obtained without them. Eye pain is best relieved by eye drops of neosynephrin hydrochloride and pontocaine, as follows:

Neosynephrin hydrochloride 1% solution	4.
Pontocaine hydrochloride	.04
Saturated solution of boric acid	12.

Holocaine 1 per cent or butyn 2 per cent are also satisfactory. Cocaine must never be used, for it tends to aggravate the drying of the cornea that is caused by the gas. Atropine sulphate, 1 per cent, should be instilled into the eye every hour until effective mydriasis is produced and the instillation should be repeated once daily until the eye has recovered. Dark glasses should be worn but bandages are not recommended. The lids should be lubricated with a bland ophthalmic ointment or liquid petrolatum (sterile). If the injury is severe, an ophthalmologist should be consulted if possible. The treatment is not specific and a competent ophthalmologist, even without special knowledge of gas injuries, will know how to handle the problem after he has seen the deep corneal injury and the associated iritis. It should be constantly kept in mind that lesions due to the vesicant agents are extremely susceptible to infection and consequently a meticulous observance of asepsis is necessary in the treatment of lesions of the eye as well as in other locations.

The skin: Extensive skin and mucous membrane lesions may be associated with severe surgical shock. This condition should be treated first. Local treatment should be delayed until shock has been controlled. The treatment of shock consists primarily in three things: first, relief of pain; second, conservation of body heat; and third, the administration of fluids. The best method of administering fluids is by intravenous infusion, and the best fluid is human plasma but whole blood is quite satisfactory and saline or glucose solutions will serve well when plasma or blood is not available. The skin lesions should be treated as if they were thermal burns, except that coagulants should not be used in the local treatment because it is desirable that toxic products of hydrolysis of lewisite and of the nitrogen mustards be permitted to flow out with the exudate rather than be absorbed. Pontocaine compound ointment (N.N.R.)

is useful for relief of pain.* The blisters should be drained or removed unless it is certain that lewisite has not been used, but it should be done under strict aseptic precautions. If conditions are not satisfactory for such technic, it is probably best to leave the blisters intact until the patient can be moved to an operating room where proper debridement can be done. Any aseptic local treatment may then be applied except one which involves coagulants. The recently developed sulfa-film would probably serve admirably, for secondary infection is the greatest danger.

Respiratory tract: The pontocaine-neosynephrin drops used for the eye also serve admirably to allay pain and edema in the nasal passages. Steam inhalations are of great value for the irritation of the larynx and trachea. Codeine is useful for the cough. Expectorants are contraindicated in the acute stage. Oxygen therapy should be used for dyspnea resulting from pulmonary edema and under exceptional circumstances tracheotomy may be required for edema of the glottis. From the second day on, bronchopneumonia is likely to develop and should be treated in the usual way. This complication should be far less deadly now than in 1917-18 because of the introduction of the sulfonamides in its treatment. One should bear in mind that some of the vesicants tend to cause agranulocytosis and that the sulfonamides share that tendency.

Gastrointestinal tract: Nausea and vomiting may occur, due to swallowing the chemical agent. This is usually temporary and may be relieved to some extent by the oral administration of sodium bicarbonate solution. If hematemesis and diarrhea with abdominal pain occur, the treatment is symptomatic. It should be remembered that under such circumstances the toxic agent has already been absorbed and nothing is to be gained by attempts to remove or neutralize it.

Nervous system: Massive doses of the nitrogen mustards produce flaccid paralysis in animals, but it is unlikely that human beings will ever receive such doses under field conditions. There is no known treatment for this condition, but if respiratory paralysis occurs artificial respiration or the Drinker respirator would be worthy of trial.

Hemopoietic system: The agranulocytosis that occurs in experimental animals after massive doses of the nitrogen mustards does not respond to pentnucleotide. Transfusions of whole blood and of red bone marrow should be tried. Nothing is known about the results of such treatment in human beings.

*The fluid in the vesicles caused by lewisite is itself an active vesicant, so great care should be exercised by attendants to prevent further injury to the patient as well as to themselves, when this fluid is removed.

SUMMARY

This account of the vesicant agents no doubt seems a very gloomy picture because it has been necessary for me to dwell chiefly on the most serious phases of the problem. It should be remembered that:

1. There is nothing magical about the action of the blister gases. They are irritant chemicals whose effect is slight or severe in proportion to the amount of the substance that comes in contact with the victim and to the duration of the exposure. Even a very large amount of the chemical agent if removed immediately does very little damage.

2. Civilians not in the protective services do not have to stay outdoors during or after a gas attack, and if they do not, very few will be seriously injured.

3. Those who can stay in closed buildings do not need gas masks or protective clothing.

4. Those who are exposed to the gases can prevent serious damage by very simple measures that can be carried out in any home.

5. In any given gas attack, if reasonable precautions are observed only a small number of persons will be burned, and

only a small portion of those burned will be seriously injured.

6. Of those who were gassed in the last war, only 3 per cent died; this is less than 10 per cent of the mortality in injuries by shell fire or other explosives.

7. The lesions that are caused by the blister gases are not very different from those caused by fire, smoke, and steam and are susceptible to similar treatment.

8. The late effects of gassing have been greatly exaggerated. The actual late effects are entirely comparable to those that result from burns.

9. Severe systemic poisoning has been seen only in experimental animals subjected to massive doses not likely to be duplicated in the field.

10. The greatest danger to civilians from gas attacks is the development of panic. People rarely become panicky about things they understand. Therefore, civilians should be fully informed about the facts of gas warfare, with the chief emphasis placed on the methods of self protection.

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SOME MEDICAL ASPECTS OF CHEMICAL WARFARE AGENTS*

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If explosive and incendiary agents are excluded from the list, the tactical uses of chemical warfare agents are three-fold: for production of harrassment, for the causing of casualties, and for screening purposes. The harrassing agents are those which produce irritation of the eyes and upper portion of the respiratory tract. The casualty-producing agents, which so far have proved effective in war, are of two types, so far as their injurious effects are concerned. One type, called the lung irritants, induces inflammation of the respiratory tract; the other, known as the vesicants, causes inflammation and blistering of the skin, and inflammation of the eyes and the upper portion of the respiratory tract. The screening agents are those which upon exposure to air yield dense opaque smokes which conceal the maneuvers of troops, ships and planes from the eyes of the enemy.

Although the agents of chemical warfare are usually spoken of as gases, they may exist in their natural states as solids or liquids as well, and may be disseminated as solid in the form of dusts, as liquids in the form of sprays, or as gases. Liquids or solids may be vaporized by heat for purposes of dissemination. In World War I shells were the principal means for the dissemination of chemical agents, but if these agents are used in the present war, bombs or sprays from low-flying airplanes would more likely be used.

In the field, chemical agents have been used both for defensive and offensive purposes. For purposes of offense the gases and dusts, which remain in harrassing or irritating concentration for short periods of time only, were used; while for defense, and for protection of the flanks of advancing battalions, vesicant liquids, which persist in irritating concentrations for days or weeks, were employed.

Chemical agents thus far have not been used against civilian populations. If they should be used, it would appear most likely that persistent irritant liquids would be employed, for the purpose of disrupting morale, interrupting defense work, and for the production not only of immediate but also of remote casualties. To me, personally, it seems that civilian communities would have to be utterly defenseless or taken completely by surprise for chemical agents effectively to be disseminated by airplanes; and in such an event it is likely that more destruction could be wrought by explosives and incendiaries. Chemical agents might be effective if used by saboteurs, but again fire and explosion would appear to be more effective. There is also a possibility that systemic poisons might be introduced into water supplies and food, but hardly probable that this could be accomplished on a wide scale. Definitely, the greatest danger

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attending the use of any chemical agent by our enemies would be the production of panic; if this can be avoided the danger is small.

It is well, however, for physicians to know something of the effects of the chemical warfare agents, to be able to recognize cases of poisoning by them, and to be capable of applying general principles of medical treatment to persons injured by these agents. I now propose to discuss briefly these aspects of the harrassing gases, screening agents, and lung irritants, and the possibilities for new and improved chemical agents of destruction. The vesicant liquids, most important of the chemical warfare agents, will be discussed by the other essayist of the evening.

THE LACRIMATORS

The lacrimators, or tear gases, cause smarting of the eyes, lacrimation, and nasal discharge. Although they produce intolerable discomfort, they do not produce actual injury in concentrations which are obtainable even in closed places. These agents are not particularly useful in warfare, their principal uses being in the dispersal of mobs and in driving criminals from cover. The principal tear gases are brombenzylcyanide and chloracetophenone. The first of these in its natural state is a powder, the second a liquid. Both are disseminated from cartridges which contain smokeless powder; the heat from combustion of the powder vaporizes them.

THE STERNUTATORS

The sternutators are dusts which cause sneezing, coughing, burning in the throat, severe headache due to blockage of the paranasal sinuses, and sometimes nausea and vomiting. Although they cause extreme distress, no actual injury ensues. These agents were very effective when first used in World War I, because they traversed the canisters of the early gas masks, which were not equipped with mechanical filters. The principal sternutators were adamsite and "sneeze gas," both arsenical compounds. Arsenic poisoning did not result from their inhalation. Treatment consists of the use of opiates to reduce distress, and of sprays which cause shrinking of the nasal mucosa.

THE SCREENING SMOKES

The screening smokes are not used with the intention of producing casualties, but they may cause burns if one is near the site of their emission. There is also the possibility that casualty-producing gases may be disseminated in the smoke, so that persons who know the smokes to be innocuous may be deceived.

The principal screening smoke consists of very small particles of white phosphorus which ignite spontaneously in the air. Particles of phosphorus produce severe burns when they come in contact with the body. Visible particles should be removed with forceps; if many particles are present, the burned region should be covered with wet cloths until they can be removed. It is recommended that then a 20 per cent solution of copper sulphate in glycerine, with 5 per cent starch, be applied to the burned area, or that it be covered with a powder composed of heavy magnesium oxide 10 per cent, borax 5 per cent, and sodium bicarbonate 85 per cent.

The other smokes consist mostly of strong acids which cloud on hydrolysis as they come in contact with the moisture in the air. The smokes themselves are harmless, but may cause lacrimation and running of the nose. Contact with particles of the liquids, will, of course, produce burns.

THE LUNG IRRITANTS

The most effective lung irritant of the last war was phosgene, which chemically is $COCl_2$, carbonyl chloride. Chlorine, which has similar effects, failed as a warfare agent because of its light weight and therefore its lack of persistency. Phosgene is a colorless gas, about three and a half times as heavy as air. Irritating concentrations persist less than half an hour out of doors. In the respiratory passages, and principally in the bronchioles and alveoli, it incites inflammation and edema of varying degrees.

Usually no symptoms appear at the time of inhalation of phosgene, but after a latent

period of several hours, up to 24, there develop cough and thoracic pain. No further symptoms may develop, and the cough may persist for only a few hours. In severe cases of phosgene poisoning, dyspnea and cyanosis appear, moist and wheezing rales are heard in the lungs, and marked engorgement of the neck veins and suffusion of the face occur. In very severe cases the blue cyanosis is supplanted by an ashen gray color, the previously distended veins collapse, the pulse becomes rapid and feeble, and death may occur within a few hours. Nearly all persons who have significant lung irritation develop bronchopneumonia which may be fatal after a few days. If recovery occurs, it is nearly always complete; rarely bronchitis, emphysema, and fibrosis may follow as permanent sequelae. The mortality of phosgene poisoning is not high, but the outlook in cases which reach the cyanotic stage is always uncertain. It should be emphasized that severely poisoned persons may feel perfectly well for as long as 24 hours after exposure, the only symptom being an unpleasant taste to cigarette smoke.

Treatment of phosgene poisoning: Persons exposed to this gas should be put to bed at once and remain there for 24 hours, regardless of how well they feel. If cough or chest pain occurs, they should be moved to a hospital as soon as possible, and oxygen therapy instituted. If oxygen is not available, the windows of the room should be widely opened. A semi-sitting position is advisable, especially if dyspnea occurs. If deep cyanosis occurs, and the neck veins become distended, bleeding is recommended. Morphine is to be given for restlessness. Aminophyllin may be given intravenously if asthma-like wheezing is present. If the gray stage with collapsed veins and feeble pulse is reached, plasma transfusions may be of value, but a fatal outcome is to be expected in such a case.

After the acute asphyxial stage has passed, it is advisable to give one of the sulfonamide drugs as a prophylactic against pneumonia.

THE POSSIBILITY OF NEW CHEMICAL WARFARE AGENTS

It is certain that extensive search has been made for more effective war gases, both by our enemies and ourselves, and almost certain that if chemical warfare is employed, new agents will be introduced. Agents with multiple actions are undoubtedly being sought. Perhaps the introduction of systemic poisons which are more persistent than the ones formerly employed is the greatest danger to be anticipated. Among such possible agents may be listed compounds of the heavy metals, carbonyl compounds, alkaloidal substances, and cyanide combinations or mixtures.

It is also certain, however, that it will never be possible to destroy great armies with chemical agents, nor to wipe out the populations of cities. At most, the use of new agents will create but a temporary tactical advantage. As stated previously, in their panic potential lies the greatest danger if gases are ever used against our civilian population.

I hope that the field is now cleared of the dusts and smokes and irritants, in preparation for the dissemination of knowledge regarding the vesicant liquids—the subject of the essayist who follows me on the program.

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SOME OF THE THINGS THE GENERAL PRACTITIONER SHOULD KNOW ABOUT THE ELECTROCARDIOGRAM

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The electrocardiogram is being used more and more as time goes on. This is as it should be, for it is of great value in the diagnosis of heart disease; but as happens with all new instruments of examination, there are many mistakes made in the interpretation of the curves. People are made unhappy and their activities restricted unnecessarily by the lack of knowledge of just what the electrocardiogram means to the individual patient. A great clinician said many years ago that the stethoscope at that time had done more harm than good. There was probably some truth in this, but now

we consider it indispensable in our work. Those who have been in practice 25 years or more can remember the early mistakes in x-ray diagnosis that brought sorrow and financial loss to the patient and his family. Happily this is not true today, and radiology has come into its own and needs no defense. The blood pressure instrument also has had its victims; now the electrocardiogram is taking its toll.

The physician's job is to relieve suffering, whether it be organic disease or the fear of disease. Let us all do our utmost to create no new fears.

Every person who has heart disease does not need an electrocardiogram, but no patient can be said to have had a thorough examination unless an electrocardiogram is made. People with large hearts, with congestive failure caused by old rheumatic valvular disease or hypertension, or cases of luetic heart disease with wide open aortic regurgitation with congestive failure, do not need electrocardiograms unless there is some irregularity of the heart that is not understood from the clinical examination.

It must be remembered that a normal electrocardiogram does not eliminate the possibility of heart disease. Cases of angina pectoris are frequently seen in which the electrocardiogram is normal, and normal curves have been noted a few hours before coronary occlusion and even when the patient was in pain. Furthermore, the electrocardiogram is of little help in prognosis. It should be considered only as a part of the examination, and balanced with the history, physical findings and in some cases, x-ray, blood count, and so on.

It is a mistake to accept minor changes in the electrocardiogram as proof of heart disease and so inform the patient, thereby running the risk of starting a neurosis that may take months or years to overcome. Patients are sometimes told that they have heart disease, when the opinion is based on an electrocardiogram that, according to our present standards, is within normal variations. Such an error may play havoc with the peace of mind of both the individual and his family.

There is a tendency on the part of some practitioners to depend too much on the electrocardiogram and to neglect the clinical picture. The training of one who reads the curves is of vital importance. This holds true of course in all branches of medicine; but a graph of some kind seems to carry more weight at times than a statement concerning physical findings.

Occasionally curves are seen that are deffinitely abnormal, especially in the electrocardiogram of people in middle or later life. These abnormalities are caused by some small lesion in the conducting system. They are too small to affect the function of the heart, and since they are not progressive, do not affect the well being of the individual. Puzzled by some vague symptom, if the physician grasps this as proof of clinical heart disease and passes this diagnosis on to his patient with restrictions and treatment, he may do more harm than good. Persons in this group should be classed as subclinical. In other words, the trouble is below the clinical horizon and needs no treatment other than sensible living and moderation in all things. Some will develop clinical heart disease and die; others will develop clinical heart disease and live out their lives; still others will live into old age without showing any clinical signs of heart disease, the electrocardiogram remaining constantly abnormal. The prognosis in these cases will depend on the clinical picture.

Those who read electrocardiograms should determine whether the patient has taken digitalis or quinidine in the near past. More than three weeks are required in some cases, for the effect of digitalis to disappear. The physician should know whether the patient has smoked just before the making of the curve. The position of the patient, whether sitting or lying down should be noted.

No attempt is made here to point out the type of case in which the electrocardiogram is of great value, but a few are mentioned as a warning against some of the pitfalls in its use.

THE ELECTROCARDIOGRAM IN LATE LIFE

A 59 year old farmer with no cardiac symptoms was examined in March, 1941. A complete physical examination was negative, although the electrocardiogram was definitely abnormal. The T waves were inverted in all chest leads; flat in Lead I; upright in Leads II and III. If this man had presented symptoms that could have been considered as due to heart disease and his physician had ordered an electrocardiogram, the curve would have shown definite evidence of myocardial disease and the patient would probably would have been restricted in his activities unnecessarily. In the absence of physical findings, no treatment or restrictions were advised and at the end of two years he still remains well and at work. This case brings out the fact that persons in middle life can present definitely abnormal electrocardiograms, and go happily on their way without symptoms.

UNSOUND RELIANCE ON ONE ELECTROCARDIOGRAM

The error is sometimes made by depending on one electrocardiogram, as in the following instance. A 56 year old man was seen in February, 1939, complaining of having suffered in the previous three days three attacks of severe pain across the front of the chest and radiating into each arm. The attacks developed while the patient was at rest and one attack lasted nearly three hours. He was examined about 12 hours after the last attack. The man felt a little weak, but otherwise made no complaint, had no fever and no leukocytosis. The findings of the physical examination were essentially negative and the electrocardiogram was entirely normal. The patient continued to feel well, but four days later the electrocardiogram was definitely abnormal. It was not typical of myocardial infarction but showed that something had happened to the myocardium. A diagnosis of mycocardial infarct was made. The patient rested for a month and then returned to his work, having had no more cardiac symptoms. He died two years later from other causes. Autopsy showed that he had had a small infarct. There might easily have been some question about the diagnosis in this case if only one electrocardiogram had been made.

If the patient has an abnormal electrocardiogram and has atypical symptoms, one should be careful not to consider the symptoms due to clinical heart disease merely because the electrocardiogram happens to be abnormal. In 1928, I examined a 61 year old woman who suffered precordial pain but gave a rather vague description of pain which was not associated with exercise. She also complained of shortness of breath and swelling of the lower extremities. The electrocardiogram showed complete left bundle branch block. The clinical picture here presented might well lead to a diagnosis of heart disease with congestive failure. The electrocardiogram was certainly abnormal, but the physical examination was essentially negative. On careful study it was found that the shortness of breath, of which she complained, was sighing respiration. The swelling of the lower extremities was found to be due to varicose veins. The chest pains were not typical of angina; there was no valvular disease and the blood pressure was normal. There was no history of hypertension and the heart was normal in size. The electrocardiogram was the only real evidence of heart disease. After 15 years she is working part time. She has a few of her old symptoms but complains much less than when first seen. The electrocardiogram still shows bundle branch block. She recently walked 70 city blocks without distress. This is certainly not bad for a 76 year old woman.

One can see that this patient's symptoms might have been misinterpreted and the electrocardiogram could have been used as positive proof of serious myocardial disease. She evidently had some disease of the myocardium involving the conducting system, but it was not progressive and it has caused her little trouble in the last 15 years. This case is mentioned to show that even in the presence of an abnormal electrocardiogram, symptoms are not necessarily due to heart disease unless they are typical. In other words, the changes in the myocardium may be so slight that they do not dis-

turb the function of the heart even though they change the electrocardiogram.

On another occasion a man 61 years old was examined whose findings were essentially negative, except that he was overweight. The electrocardiogram was exactly like that of the woman just mentioned, but the man presented a typical angina of effort. He lived only a little over four years from the time he was first seen, and died from heart disease. The electrocardiogram in these two cases looked just alike; each was definitely abnormal. The clinical picture was the differentiating factor.

NEED OF CORRELATING CLINICAL FINDINGS WITH ELECTROCARDIOGRAM

To give another instance of the prime necessity for the correlation of clinical findings with the electrocardiogram in making the diagnosis, the following case is cited. In 1936 I examined a 22 year old male office worker. He was large, well developed and healthy looking, but gave a history of attacks of fast beating of the heart. He had been examined by several doctors and no signs of heart disease had been found. The electrocardiogram showed a peculiar type of curve: short PR interval—wide QRS complexes. This type of electrocardiogram is typical of what is known as the Wolf-Parkinson and White syndrome, and is generally considered not to be evidence of heart disease, most of these patients suffering from attacks of paroxysmal tachycardia. Following this original electrocardiogram, the report had gone back to the physician that the electrocardiogram showed myocardial disease. The patient and his family had been advised accordingly and a great deal of alarm and distress had been created as to the patient's future. On examination, this young man showed no evidence of heart disease. The electrocardiogram was at times abnormal, at times normal. Any one who reads electrocardiograms should know of this condition, as a great deal of harm can be done when a mistaken diagnosis of serious heart disease is made. The young man is now an officer in the U. S. Navy.

This case brings out the fact that it is unwise to make a diagnosis of disease of the heart in the young, when no significant physical findings are discovered in a thorough examination. In rare cases this is not true, notably in rheumatic fever and acute infections, such as diphtheria. Under these circumstances, the changes in the electrocardiogram may be the only evidence of cardiac involvement.

When a physician sends a young patient for an electrocardiogram, and he receives a report that the electrocardiogram shows definite evidence of myocardial disease, he should review the case thoroughly. When there is no enlargement of the heart and no significant murmur can be heard, he should be slow in making a diagnosis of organic disease. There are exceptions, however, as in the case of small children.

An eight year old girl was examined some time ago whose complaints were irritability, poor appetite, failure to gain weight and an occasional rise in temperature above the normal. There were no joint symptoms. Physical examination was negactive except for a faint systolic murmur heard in the apex. This kind of murmur is frequently heard when the heart is sound, but the electrocardiogram in this girl showed the first stages of A-V block with wide and slurred QRS complexes, and thus a diagnosis of active rheumatic fever was made.

SPURIOUS HEART DISEASE

Richard Cabot in his book "Facts on the Heart" states that most heart disease is imaginary; that 14 out of 18 successive patients sent to him by physicians for supposed heart disease had, in his opinion, perfectly sound hearts. This was written 16 years ago and it is almost the experience of those who pay special attention to cardiac disease today. In my experience, the percentage would not be so high, but it is too high for the good of all concerned.

People with neurocirculatory asthenia, with palpitation, dyspnea, chest pains, or some insignificant murmur, make up a large percentage of the mistaken diagnoses then, as they do now. If these patients are sent for an electrocardiogram and too much is read into it, this report going to the phy-

sician or patient makes a bad matter worse. Patients present themselves for examination who, in my opinion, have no heart disease. They come bringing with them one or more electrocardiograms with reports written in plain English "evidence of myocardial disease." It is a grave mistake for doctors to put reports of this kind into the hands of patients. One can see how serious this would be in the case of some nervous individual who has no heart disease, even though the report might indicate that he has. As a rule people are more frightened by a diagnosis of heart disease than any other ailment. In a few weeks' course on electrocardiography, it is impossible to learn enough to be competent to make proper evaluations. Time and study are required for this.

SUMMARY

It is not the aim of this paper to belittle the electrocardiogram, but rather to emphasize some of its limitations. It is of great aid when properly evaluated, and in any case, where the status of the heart is in question, the patient should be given the benefit of it, but with a clear understanding that it is only a part of the examination.

THE PROBLEM OF INDUSTRIAL HYGIENE*

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The health of the man behind the machine makes all the difference in the world to the man behind the gun.

Industrial hygiene is concerned with every phase of the health of the man behind the machine, whether it is the industrial dust in the air he breathes or the food his wife has packed in his dinner pail. In short, it is the problem of keeping the worker on the job, and in good health, so that he can work at top efficiency.

Prior to the war great strides had already been made in our concept of industrial hygiene and in our application of new knowledge. Realizing that the health of the worker is influenced both by his working environment and by many outside factors, we had broadened our scope of usefulness in the field of industrial health and maintenance. Progressive leaders in management and in industrial hygiene began giving their attention to such influencing factors as housing, mental health, improved nutrition, and the provision of medical care. Moreover, it was not a very difficult matter for management to bring and keep under control hazardous conditions in the working environment itself, as attested by our decrease in occupational accidents and in many of the occupational diseases. Industry was beginning to abandon the use of many toxic materials such as benzol and other solvents, toxic metals such as radium and mercury, and hazardous processes such as the use of sand as an abrasive blast-cleaning material.

In so far as living conditions went, no very serious problem existed, since industrial communities were developed leisurely as the needs arose. With no restrictions on tires and gasoline, it was a simple matter to travel long distances to work at those factories not adjacent to ample housing facilities.

This does not mean, of course, that we had solved all of our problems in industrial hygiene before the war. In fact, one of the real advances we had made was to secure a clear definition of the national problem through careful studies made by the Public Health Service in cooperation with state health departments. These surveys showed widespread potential hazards from accidents and occupationad diseases, meager facilities for their control, and even scantier provisions of industrial medical services. The problem of the small plant was especially troublesome. And the lack of teaching facilities in industrial medicine was a real problem.

Even in normal times the amount of time lost by workers in this country from various types of disability amounted to the astounding total of more than 400,000,000

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days a year. Today, of course, with our larger labor force and with the many hazards associated with war production, this figure is closer to a half billion man days lost from disability alone. However, those of us who had been associated with this work over the last twenty years realized that great strides had been made and were being made in the improvement of the working environment. Perhaps the most significant advance was the establishment of governmental industrial hygiene services to assist industry, labor, and the professions in a number of states.

The present war has changed the entire picture in such a revolutionary manner that our previous problems now appear to be slight by comparison. In a mechanized war we have many new industrial problems. The success with which we meet them affects the lives and the success of our fighting forces.

The industrial hygiene problem in total war involves not only the working environment—the machines and conditions of work—but also the composition of the labor force itself, and in addition to that, the home and community environment of the worker. All of these problems and the success with which we meet them determine the health and efficiency of the worker on the job.

The first and most important task of industrial hygiene is the maintenance of a safe and healthful working environment. Toward that end, we must foresee exposure to many kinds of hazards and we must be prepared to eliminate or control such hazards. The foundation of industrial hygiene work, then, is constant research into the causes of occupational diseases and injuries and the development of control measures.

In our research we must determine the toxicity of substances such as explosives, solvents, and other chemicals, metals used in airplane and munitions construction, and components of synthetic rubbers and plastics.

We must develop instruments for the detection and measurement of toxic dusts, fumes and gases. The problem of fatigue in relation to hours and types of work is a problem constantly demanding attention. The protection of human beings under crowded working and living conditions is another angle which industrial hygiene is bound to consider.

Just as swift-moving events in our variegated warfare change the kinds of weapons used in combat, so circumstances change our problems on the home front. Shortages and priorities, for example, have put new solvents of unknown toxicity on the market. Old materials, such as benzol and carbon tetrachloride, have come into greater usage.

One company, for instance, had gradually restricted the use of benzol to the point where none was used in their plants. Recently, their industrial hygienists found that benzol was being used in a new process for polishing reflectors. The present operations personnel, never having had any experience with benzol, were surprised to learn that it was a toxic substance. A few trial runs showed that a solvent naphtha could easily be substituted. They have since improved the properties of the compound used, proving that production gains may sometimes be made by investigating hazardous materials.

In many cases, benzol is replacing the less toxic toluene which is being used as a starter in the manufacture of TNT. Our engineers have just completed a survey on benzol, indicating its hazards, industries wherein they exist, and standard methods of control which can be applied in any size plant.

We are now studying a mixture essentially of benzol and toluene, containing in addition a small percentage of other aliphatic and aromatic hydrocarbons. It has been advocated as a substitute for toluene, with the claim that with this mixture the toxicity of benzol is attenuated to such an extent that it is not liable to cause chronic benzol poisoning. In order to protect the health of workers handling these materials, it appeared imperative to check on the validity of this claim, because it is contradictory to past experience.

Increasingly large quantities of chlorinated solvents such as carbon tetrachloride and trichlorethylene are being used in vapor degreasing of metal parts. Control of these vapors in most degreasing tanks has in the past been accomplished by condensation methods. Now we frequently find that the production pace has been stepped up so high that cooling coils cannot be kept below the temperature required for satisfactory condensation. Consequently, workroom air is contaminated. If additional cooling capacity cannot be provided, use of local exhaust ventilation and, if possible, enclosure of the process are recommended.

Recently, in one plant it was found that small percentages of trichlorethylene would serve as well as the more dangerous carbon tetrachloride—another example of new production gains through investigation of dangerous materials.

Lead tetraethyl is being used in the lower grades of gasoline to increase the octane rating of motor fuel. This would not be very important if it were not for the fact that these gasolines have been used throughout many plants for various washing purposes. This means that the men get their hands, and sometimes portions of their bodies, in contact with gasoline which now contains an extremely toxic lead compound which can be absorbed through the skin.

Gasoline containing tetraethyl lead has been widely used in stoves in trailer camps where large numbers of industrial workers live. Unless this practice is eliminated, serious injuries may develop wherever trailer camps are located. In Maryland the authorities have conferred with representatives of the oil industry, and lead-free gasoline is now available to trailer residents who have been warned of the danger.

Certain metals used in airplane and munitions construction constitute various health hazards. For example, the demand for mercury, used in the manufacture of munitions and precision instruments, has resulted in reopening old quicksilver mines, where operations have begun without installing the equipment necessary to prevent dissemination of mercury vapor and dust.

Metal spraying operations expose operators to hazards from metal fumes of all kinds, including lead. Such operations should be performed only in booths equipped with proper exhaust ventilation.

Alloys of unknown or implied industrial hygiene significance, and toxic metals, such as cadmium, are replacing aluminum and chromium. Control of possible fumes or vapors is indicated in these cases.

Tellurium, which has known toxic properties, is being used for special steel alloys. If toxic concentrations of tellurium are detected, control can probably best be secured by local exhaust ventilation.

Among the studies under way on the toxicity and potential dangers of the heavy metals and their compounds are those on beryllium, vanadium, and molybdenum. These metals are becoming increasingly important because of the unusual mechanical properties of some of their alloys. These studies were undertaken because sufficient data were not available for an evaluation of permissible concentrations.

The silicosis hazard associated with abrasive blasting operations is increasing in magnitude since it has become necessary in both new and old installations to return to the use of silica sand as an abrasive instead of steel shot or grit. However, the sand blaster can be protected if properly designed and well maintained equipment is used.

The substitution of silicon carbide cutting instruments for those of steel, as well as the replacement of cutting and milling with abrasive grinding processes, introduces new dust hazards which may be detrimental to the health and will certainly affect production adversely.

The enormous demand for precision instruments in war production has reintroduced the threat of radium poisoning among luminous dial painter, as occurred during World War I. This problem is made especially difficult by the sub-contracting system which has spread the work among many small shops in many states, without leaving any central source of information

as to the location of these industries. Recently, the National Bureau of Standards has issued a Handbook (H27), setting forth in considerable detail the precautions to be taken in the safe handling of radioactive luminous compounds. The significant point is that radium dial painting can be done safely, if industries are aware of the danger and follow standard precautions.

One of the serious industrial hygiene problems is control of the hazards resulting from the electric welding arc. The production drive has multiplied its use many times without multiplying the supply of protective equipment.

The hazards of the electric welding arc are many. Burns, electrical or from molten metal, may occur. The effects of ultraviolet radiations from the flash of the arc are dangerous. Oxides of nitrogen fixed by the arc may cause severe and even fatal poisoning. Metal fume fever may result from breathing certain metallic oxide fumes produced when welding galvanized iron. There is the danger of exposure to carbon monoxide and other products of incomplete combustion from the coating of the welding rod. We are also familiar with the possibility of lead poisoning when painted parts are to be welded or cut, and with the ill effects of fluorides when welding stainless steel.

Effective methods for the control of all these hazards are known, but their application has been "too late and not enough" in many instances. While it is true that the supply of protective and control equipment has not kept pace with the demand in some cases, other means for securing protection could have been devised. Frequently, insufficient measures have been taken to shield the arc and protect other workers in the vicinity from welding flash, or to remove toxic gases and fumes by local exhaust ventilation.

The tremendous acceleration in industry is reflected by an exaggeration of old familiar dermatoses problems. The search for substitutes for priority materials has led to new cutaneous exposures. These substitutes may expose not only industrial workers, but the Armed Forces and the civilian population who use products made from these substitutes.

Dermatitis is the chief industrial hazard in munitions plants. Most of the explosives such as TNT, DNT, tetryl, ammonium picrate, and fulminate of mercury, belong to the class of compounds known as skin sensitizers. By this is meant that certain individuals having cutaneous exposure to these compounds develop a specific hypersensitivity, following an incubation period of several days or longer, after which they develop dermatitis whenever they have cutaneous exposure to the specific compound. Among the explosives, tetryl is the most powerful sensitizer, the percentage of workers affected being estimated at anywhere from 10 to 30 per cent. The degree of cutaneous exposure necessary to induce hypersensitivity does not bear any relationship to safe toxic limits for systemic exposure.

The control of dermatoses from explosives resolves itself into reducing the cutaneous exposure of workmen to these compounds by the use of protective clothing, protective ointments, and attention to personal environmental cleanliness. Our Dermatoses Investigations Section has developed special clothing, ointments, and cleansers for this purpose.

In the manufacture of airplanes, skin hazards encountered are in the degreasing solvents and compounds, cutting oils, paint and "dope," and electroplating baths.

The solvents which are used in degreasing metal parts and as paint and "dope" thinners often cause dryness and fissuring of the exposed skin due to loss of the natural oil and fat extracted by these compounds. Degreasing tanks and mechanical cleansing equipment, as well as protective clothing, will remove this hazard.

Metal plating and other rust-proofing processes are carried on in airplane plants, furnishing potential skin hazards from alkaline cleansing and degreasing baths, acid baths, and solutions in the plating tanks themselves. The Division of Industrial Hygiene has devised special venting apparatus

for plating tanks, which, in addition to protective clothing and ointments, largely removes the skin hazards in these processes.

Cutting oils are another skin hazard. The mechanization of modern armies calls for the production of much mechanical equipment, which involves considerable metal work, a large part of which necessitates milling and machining. The use of cutting oils is essential to these operations, and the machinists have a certain amount of unavoidable exposure to these oils. A certain percentage of these machinists develop comedones, folliculitis, acne, boils, and sometimes, eczemas of those skin areas exposed to the oils. Wounds from steel cuttings may afford portals of entry for infection. It is not the bacteria in cutting oils which cause these conditions, but rather bacteria on the skin and dirty clothes. Therefore, we do not advocate the addition of disinfectants to cutting oils. Environmental and personal cleanliness, protective clothing when necessary, and filtration of the cutting oils to remove the steel cuttings are the principal measures for preventing cutting oil dermatitis.

Recently we have encountered a new form of cutting oil dermatitis. The lesions are not only of a different character, but the face and neck are frequently involved, which is not usual in the ordinary type of cutting oil dermatitis. This problem is now under investigation, but present indications are that eruptions of this type are associated with the organic chlorine compound content of certain cutting oils.

One industrial problem which deserves special attention with the increase in the horsepower of airplane motors, is the problem of excessive noise. High sound intensities long continued may cause deafness. In the past, the testing of motors was kept to a 90 decibel level or lower. But with airplane motors of 2000 horsepower and upwards, the test rooms may have noise levels from 120 to 140 decibels, even though scientific methods of sound deadening have been adopted.

One solution is the installation of sound deadening baffles about the pipes and motor on a hinged arrangement, allowing for ready access to all parts of this equipment. Sound deadening ear plugs could be used. One company whose employees are exposed to high levels of sound gives special physical examinations to detect injury before it becomes serious.

Industrial hygiene, like war production, is concerned with men and women as well as with machines and materials. Hence, the manpower problem is closely related with the industrial hygiene problem.

The labor force today has an almost totally new character. It is larger than ever before. More women are among its ranks. It consists of many old, many young inexperienced, and many handicapped workers. The needs of our Armed Forces, the geographical location of war industries, the uneven distribution of war contracts, priorities, and conversion have all created dislocations and shortages of labor.

At the end of 1942, we had 57,000,000 workers—18 million in direct war production. At the close of 1943 we will have about 38 million in war activities, including the Armed Forces. About 25 million will be engaged in civilian production. Of this huge industrial and military force of 63 million, 20 million will be women; and of this 20 million, 6 million will be engaged in war work.

The fact that women constitute such a large proportion of the labor force presents new industrial hygiene problems which must be met if war production is to use womanpower to best advantage.

The conservation of woman power should offer no more of a problem than the conservation of manpower. If we give women healthful working conditions, adequate training in safe practices, and good medical services, we can expect as good results in reducing the time lost due to industrial disabilities among these new employees as we know we can obtain among men.

To win the war, all of the manpower must be used. Many workers must be salvaged who are handicapped by major and minor physical defects. The physical standards for employment must be adjusted

to immediate needs. The preplacement examination should be used as a tool to place all workers, including the physically handicapped, in jobs best suited to their capacities. This examination, therefore, requires the closest cooperation between the employment office, labor unions, and the industrial hygiene service.

An example of cooperation between Federal, State and local agencies in the placement of workers is found in Connecticut. Here the Committee on Industrial Health of the Connecticut State Medical Society, the Manufacturers Association, and the Vocational Rehabilitation Service of the Connecticut State Department of Education have set up rehabilitation clinics with follow-up study for handicapped workers. Orthopedic appliances and training are provided where necessary.

Three problems which belong in the province of industrial hygiene and about which you have read a great deal in your newspapers are fatigue, absenteeism, and nutrition.

In connection with fatigue and hours of work, I should like to call your attention to the recommendations recently issued by eight Government agencies in Washington on hours of work for maximum production. After careful study of the entire problem, these agencies, including the War and Navy Departments, Maritime Commission, War Manpower Commission, War Production Board, Commerce Department, Labor Department, and Public Health Service, recommended a 48-hour week, one scheduled day of rest for each worker approximately every seven days; a 30-minute meal period in mid-shift, and in occupations that involved contact with poisonous substances, sufficient time for workers to wash before eating.

A problem which is not new, but which has recently become acute, is the troublesome problem of absenteeism. In normal times, the workers lose from eight to ten days a year from disability alone. However, our personal observations and reports we receive from many plants indicate that the disability absenteeism problem is minor when compared to total absenteeism. In many plants five times as much time is taken by workers for non-disabling causes than from those attributable to accidents or illness.

There are many reasons for these absences—boredom on the part of workers, taking time to spend the large amounts of money earned, searching for homes, transportation difficulties, necessary shopping and often just playing hookey.

Absenteeism may be lessened in several ways such as provision of shops convenient to the plants, provision of barber shops and beauty parlors on the plant property, and certain disciplinary measures. Moral persuasion has proved successful in a number of instances. One manufacturer called into conference all returning employees on the day following their absence and explained to them how the absence of such a large number of people wrecked production schedules.

The labor unions can assist in keeping down absentee rates. Acting as the employees' chosen representative, they often can and will exert influence and pressure on the worker.

Living up to the standards of good nutrition is a problem of prime importance with the advent of rationing. However, even with rationing, well planned and well balanced meals can be prepared. Secretary Wickard of Agriculture says we must do three things to achieve good nutrition under wartime conditions: "We must push production of necessary foods right up to the limit; we must see that every family has the chance to get its fair share of the total supply for civilians; and every family must make the wisest possible use of its share."

Education, not only of the people in industry, is important, but education of commercial caterers, including the proprietors of hot dog stands, coffee shops, and similar places in the environs of plants.

Education is not the whole answer. We must make sure the worker has a chance to get the food he needs. There are plants with 20-minute lunch periods where the

workers, if they use the cafeteria, must count on standing in line for 10 or 15 minutes. Cafeterias and lunchrooms should also be available to those on night shifts.

Between-meal refreshments are desirable, but they should consist of more than candy and soft drinks.

A worker's health is as much a product of his home surroundings as his shop environment. Nine out of every ten absences from work because of illness are the result of diseases or accidents occurring in the workers' homes and the community—not on the job.

Industrial health and community health are like the parallel lengths of a ladder, connected by many rungs all the way down the line. If one rung is defective, the entire ladder wavers.

The rapid expansion of industry has strained community facilities to the utmost. War contracts have been unevenly distributed geographically so that at one time 73 per cent of the war contracts were allotted in 20 industrial centers containing 22 per cent of the population. In some centers, the demand for war workers has not yet reached the peak. It is easy to see why community facilities are cracking under the strain.

Crowding, poor housing, transportation difficulties, the lack of sufficient medical facilities, schools and recreation and other welfare services all combine to threaten health, disrupt normal family life, and contribute to the rapid spread of infectious diseases. It is no wonder we face rapid labor turnover and high rates of absenteeism.

The strengthening of general health services in a community thus becomes an essential part of the industrial hygiene program. The industrial physician, of course, should be able to rely upon his local health officer to fight this rearguard action in support of his front line attack against time losses on the war production front. The Public Health Service has been assisting the States to hold the line against preventable diseases by recruiting and training nearly 1000 professional workers and assigning them to critical war areas; but in many "boom towns", where the health authorities have been hamstrung by local inertia, truly appalling conditions remain unchecked. The private practitioner here faces the tremendous responsibility of bringing pressure to bear on local authorities, on industry and upon health authorities to correct such conditions.

It is true, local shortages of medical, dental, nursing and other professional personnel make the solution of these problems unusually difficult. Nevertheless, the solutions are already available in many communities or can be made available if the needs of the workers are recognized objectively and assistance is sought.

When we think of industrial health in its modern concept, it seems to embrace the whole of life in a free democracy. The solution of individual problems rests upon the degree to which the industrial hygiene program considers the "whole man"—his home and his job, his family and his friends, his food and his drink, his loves and his hates, his financial problems, and his attitudes toward all these everyday relationships which make up modern life.

No matter how small the effort made for the improvement of industrial health, we shall have the abiding satisfaction of knowing that we have answered with a ringing affirmative the crucial question, "Has it helped to win the war?"

SOME TOXIC REACTIONS OF COMMON EXPLOSIVES

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Our ever increasing effort at arms production is bringing to a large number of physicians problems that heretofore were confined to a small group of industrial doctors. I refer to the care of persons suffering from the several occupational diseases associated with explosives manufacture and shell filling. Until lately, the recognition and treatment of toxic manifestations resulting from exposure to such materials as TNT, tetryl, mercury fulminate, and smoke-

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less powder, were the interest of a small number of industrial physicians who were directly associated with one of the arms manufacturers. Today, however, with new explosives plants being built all over the country, it behooves the physicians to know something of the behavior of the best known of our explosives.

Unfortunately at the very time that this information is most necessary, everyone is too busy to lend much study to it. If we are to duplicate our efforts in the last war, we may expect to see a great deal of work appear in the literature on this subject just after the war is over. This will make interesting reading but will not help in the treatment of patients, as by that time the war workers may be expected to be returning to their old occupations. Study of the available literature reveals some little help but most of this work was done during the last war and the gloomy picture cast is not really a reproduction of what we find today. Several explanations are offered for the high morbidity and mortality seen in the munitions workers of World War I. The best idea seems to be that specifications for TNT were not so high as today and therefore with a lower melting point there was more apt to be present as impurities isomeres of TNT, DNT, and other substances. Some of these products can be shown in the laboratory to be much more toxic than pure TNT. Another important improvement is seen in the better engineering of today's plants, providing better ventilation, segregation of workers during hazardous jobs, and much more adequate care of workers, including frequent examinations, provisions of protective clothing and ointments, and emphasis on cleanliness both in housekeeping and personal hygiene.

To the physician connected with munitions work, this paper may seem elementary, but the group to be reached is the private practitioners who will see an occasional case of poisoning and who may be led considerably astray if they are not familiar with those materials. That this is true, is well shown by the fact that several cases of toxic hepatitis due to TNT went unrecognized in England until a day or two before death.

TRINITROTOLUENE

This aromatic nitro compound was made in the laboratory by Hepp in 1880, and in 1902 it was first used for shell filling by German military authorities. Other countries soon followed the lead until now it is the principal military explosive. TNT, also known as trotyl, tritolo, tritone, trotol, trinol, triton, and trilite, is a pale yellow material melting at 81° C. When heated there is a characteristic pungent odor. Of the six possible isomeres, the 2:4:6 variety is the one in general use as a military explosive. Before the last war, TNT was considered non-toxic but in the first year of World War I, England alone produced 50 deaths due to toxic hepatitis and in the first seven and a half months of 1917 there were reported more than 17,000 cases of toxic jaundice, with 475 deaths. Since that time, many more deaths have been reported from all countries where it has been used. During this war there have again been deaths in England, Canada, and Finland. Until very recently it seemed that we in this country were not going to see fatal poisoning because of the care used in handling the materials. Unfortunately, this is not true as at least one death has occurred and there may have been several others. Nearly always the picture is the same. A young employee, usually under 25, most often an underweight woman who has been working from two to four months, first has weakness, fatigue, a sense of ill health and then abdominal pain and jaundice. The jaundice progresses rapidly to a deep discoloration, and unless treatment is begun early, death may result. In the fatal cases, autopsy findings are nearly always acute yellow atrophy or liver necrosis. Other fatal cases have been called aplastic anemia and show that sort of blood picture. The bone marrow, however, is not likely to confirm that diagnosis and it is possible that this is only a severe example of the anemia often seen and is due to blood destruction by TNT. This rapid blood destruction may rarely be a cause for jaundice.

This most serious result of TNT exposure is mentioned first only because it is often fatal. The common evidences of exposure are anemia, which is usually mild and will be seen in as many as one-third of the workers exposed, cyanosis varying from mild to severe, and weakness, fatigue, irritability and mild gastric disturbances. These are the things to be on the lookout for, as they are apt to foreshadow the approach of a toxic hepatitis.

The most common type of disturbance is a dermatosis. This causes a great deal of annoyance but results in little lost time. The reaction is apparently a sensitivity phenomenon as TNT is not a primary skin irritant. The hands are most often affected, the picture being that of a vesicular lesion seen between the fingers and around the edges of the palm. The vesicle may be deep seated, producing the characteristic "sago grain appearance." The next most common site of appearance is the anterior surface of forearms. Here the picture is that of a papular erythematous dermatitis. The points of irritation of the clothes on the body such as neck, ankles, and belt line are next in frequency and the appearance is like that on the forearms. The course of the disease is usually mild with the hand lesions drying and scaling, and the other lesions generally fading and disappearing. The dermatosis usually appears after a week to two weeks of contact with TNT and as a rule will disappear in a few days to a week. Occasionally, however, the reaction may be severe with scaling of the entire skin of the palms and a generalized dermatosis over the entire body. The rash usually causes no discomfort but there may be some burning and itching. Scratching may result in a generalized pyodermia but this is very rare. Nearly all workers will continue at their jobs through their period of "hardening." Following the dermatosis the worker appears to enjoy an immunity as long as he remains on the job. An immunity to the skin disease, however, does not mean an immunity to the constitutional effects of the poison. It is interesting in one group of seven reported cases of toxic jaundice that none of the workers had ever had a dermatosis. The presence or absence of a skin reaction has absolutely nothing to do with the likelihood of development of other toxic symptoms. The dermatosis is most likely to be seen in employees handling amatol which is a combination of TNT with ammonium nitrate. The reason for this is apparently that ammonium nitrate is markedly hygroscopic and causes the material to adhere to the skin. In that the skin is a principal route of absorption of TNT it is also true that amatol workers suffer from much more toxic jaundice than handlers of pure TNT.

TREATMENT

The treatment of the more severe types of poisoning, that is jaundice, should be infusions of glucose as well as a large amount of carbohydrate by mouth. The individual should also receive transfusions and there seems to be some evidence that large quantities of vitamins C and the B complex are of some value. It should, of course, not be necessary to mention that certain drugs such as the sulphonamides, chloral hydrate and amidopyrine, which may cause liver damage or damage to the bone marrow, should be avoided in TNT handlers and especially those people who already have jaundice. The jaundice is apt to increase for a week or two after admission and then begin to fade. One thing that must be borne in mind in the toxic hepatitis following TNT is the necessity for watching the patient for a much longer time than would ordinarily seem necessary. It is too often the case that the patient is jaundiced, hospitalized, the jaundice clears in a few weeks and the patient is allowed to go home. In a short while the patient is again jaundiced, is acutely ill, and shortly dies. This has happened more than once.

The treatment of the dermatosis is commonly only palliative and calamine lotion usually suffices. Should there be a great deal of dryness and cracking of the skin, a bland ointment, such as boric acid ointment, may be found helpful. Where the skin lesions have become infected the treatment

should be that of any other infection. As has been said, most of these workers should be allowed to continue work in order that they may develop their immunity. Other milder symptoms, noted above, require only that the patient be moved to a place where he may avoid contact with TNT. Those signs and symptoms should be considered as a warning of the dangerous results that may follow if adequate protection is not given the workers.

PREVENTION

This requires first proper engineering to give good ventilation and the use of exhaust ventilators wherever there is dust hazard or where there are fumes of TNT. All sweeping at the plant should best be done by vacuum sweepers and this is especially important since we know that several deaths have occurred among sweepers who create a great deal of dust with their brooms. The worker must be furnished with adequate protective clothing which usually consists of a coverall suit that is supplied clean daily. The legs of the trousers must come over the shoe tops to prevent TNT falling into the shoe. Where gloves are used they should best be a closely woven cotton glove with a knitted top to come up over the worker's sleeve. An even better type glove would probably be a soft, washable chamois glove with a similar top and in all cases it should be advised that there be no heavy seams in the gloves as it is along these seam lines that serious dermatosis may be seen. The reason for the knitted top on the glove, which should be obvious, is to prevent the dropping of TNT inside of the glove where it would lie in direct contact with the hand. Protective creams or lotions made especially for this type of compound should be used on the face and hands.

Proper selection of employees will play an important role in prevention of poisoning. The pre-employment examination should rule out any person with previous history of liver disease. Young people should not be employed and an age limit of 19 or 20 years should be used for the TNT lines. Although usually mentioned only in connection with women, it is also important in the men, that those individuals who are markedly underweight should be ruled out. It seems a very simple fact that should a person be very small, such as underweight young women whose weight averages around 100 pounds, then certainly a much smaller amount of a toxic material is required to cause a fatal poisoning than a large heavy weight man. This no doubt accounts for the generalized idea that women are more susceptible than men. It is only that they are smaller and a similar amount of the material causes a poisoning much quicker. Individuals who are receiving antiluetic therapy must not be allowed to work on the TNT lines as it is known that arsenicals cause liver damage and an added insult by the TNT may be too much. Persons having anemia, or other blood dyscrasias also must be eliminated. Once the employee is at work he should then be examined periodically in order that the early toxic manifestations may be observed and the worker removed to a safer place. Examination should be done about every three weeks and should consist of blood pressure readings, pulse rate, observation of general appearance with special note of skin and mucous membrane for dermatosis and cyanosis. A history should be taken looking especially for fatigue, irritability, nervousness, sleeplessness, loss of appetite and a general sense of feeling under par. Laboratory work need consist only of a hemoglobin determination. Should the hemoglobin be low, then further blood studies must be made. While spectroscopic studies for methemoglobin are of academic interest they are not practicable for the industrial physician. For following a large group of employees, as regards the amount of their exposure, the Foulger index may be of value and will tell the examiner where the greatest exposure is occurring in order that something may be done about it. The value of routine Webster tests on urine does not seem worth the amount of time required as the positive Webster indicates only exposure to TNT and the negative Webster

may mean either no exposure or a fatal poisoning.

Exceptionally good personal hygiene must be insisted upon. All exposed workers must bathe at the end of their work period. A 5 per cent solution of sodium sulphite should be furnished and the worker must apply this to his hands, forearms and face to be followed by washing with soap and water. All workers must also be impressed with the importance of wearing clean underclothes and socks daily.

There seems to be no scientific reason for giving milk or multiple vitamin products to these people other than improvement in nutrition. There has been some evidence that vitamin C may help prevent poisoning.

TETRYL

This aromatic nitro compound was first synthesized by Mertens in 1877. It was not, however, until the first World War that it became prominent as a military explosive. Tetryl is quite sensitive to mechanical shock and is a violent explosive. These properties make it very good for a booster explosive, that is, it boosts the explosion from the fuse to the bursting charge. Tetryl is a light yellow colored crystal melting at about 129-130° C. It is used in both a crystalline and a granular form. Since this material is usually pressed into pellets it is mixed with graphite or a stearic acid and this method of preparation apparently has something to do with the number of sensitivity cases seen among workers. Tetryl is practically odorless but causes a sharp or so-called sharp acid sensation, producing a tendency to sneeze.

There has been a great deal of discussion as to whether or not tetryl causes constitutional disturbances. It is true that a certain amount of irritability, fatigue and a feeling of ill health are noted in some workers with tetryl. There is, however, no authentic record of a serious constitutional poisoning due to this substance. Some workers feel that the mild symptoms spoken of may be the forerunner of a more serious poisoning. There is, however, no real background for that opinion. There have been seen in this plant two cases of an asthmatic-like condition due to tetryl. These are people who have worked for from a few days to a few weeks and find that they get short of breath and have to leave the room. The two workers seen here were examined and the chest was quite similar to an ordinary asthmatic chest. Inspiration was not particularly affected but expiration was very difficult. Both these patients were improved with adrenalin but on returning to the line a similar condition would reappear. It has been necessary to remove both of these men from the tetryl line. This type of effect has not been stressed in the literature. I am told, however, that in Canada this has caused considerable difficulty and a large number of cases have been seen. It seems quite possible that this asthmatic-like condition may be due to a sensitivity of the respiratory passages to the tetryl similar to that seen in the skin. This may then produce a reflex spasm of the smooth muscle in the small passages, causing a picture similar to ordinary asthma.

There is little disagreement regarding the dermatosis in tetryl. This is a real problem and in many plants has caused much trouble due to the fact that about 40 per cent of the workers may exhibit this type of dermatosis. Unlike TNT dermatosis the type seen with tetryl begins nearly always on the face, being seen around the outer canthus, along the naso-labial fold and at the corners of the mouth. The reaction usually comes on after the patient has been at work for two or three weeks. There is first apt to be a slight itching and irritation of the regions just noted. This is followed by puffiness, usually first around the eyes and a reddening and drying of the skin in these areas. This progresses to a rather marked edema of the corners of the eyes, sides of the mouth and along the naso-labial fold. There is nearly always considerable drying and cracking of the skin. The patient complains bitterly of marked burning of the face. The skin of the neck and anterior chest surface may occasionally be involved. The workers also seem prone to have some

nose bleed and marked sneezing due to the irritating effect of the material on the mucous membrane of the nose.

TREATMENT

Treatment of the asthmatic condition has already been indicated, that is, removal from contact and adrenalin to control the acute attack. These people will have to be permanently removed from the tetryl line. As to treatment of the dermatosis, it is essential that workers showing this affection must be removed from as much of the tetryl dust as possible. They may then continue to work on the line unless the dermatosis becomes more severe, in which case they must be removed altogether from contact. Many of the workers showing only a mild dermatosis will, if they are removed from a marked dust hazard, go on and develop an immunity much like that seen in TNT. Should the employee be so uncomfortable that it is necessary for him to leave work it is usually found that cold boric acid compresses are particularly soothing. Any individual with the tetryl dermatosis must be warned to stay out of bright sunlight and to avoid direct heat. In the milder cases, calamine lotion without phenol will give relief from the burning. The individual with the more severe type of dermatosis must avoid shaving until his skin is considerably improved. As a rule the severe cases will clear in a week to ten days after removal from contact. The milder cases, in those workers who stay on the job, will usually clear up in a few days to a week. The individual who has had a more pronounced dermatosis may, on complete recovery, return to the tetryl line where it is found that about three out of four, so affected, will be able to return to their work with a degree of immunity. Should they break out again, however, it is usually best that they be permanently removed from the line. Olive oil or a bland ointment such as boric acid ointment will be found useful in the stage of drying.

PROPHYLAXIS

Much the same that has been said for TNT will apply to prevention here. That means particularly the engineering to prevent dust. There is one particular operation in tetryl handling that causes dust, that is the placing of pellets in a long cup-like container. When the pellets are pushed into the container, air is forced out containing fine tetryl dust. This type of work should be done under an exhaust hood and behind a plate of glass where possible. Clothing and protective ointment, similar to that mentioned with TNT, are to be advised also on the tetryl line. The same may be said with regard to bathing and the one thing that will cut down a great deal of the dermatosis is insisting on frequent washing of the hands, using first a 5 per cent sodium sulphite solution, followed by a good grade of soap and water. The worker must be cautioned against wiping his face with his hands. Protective lotions or ointments applied to the hands and face are quite beneficial. Workers should also be cautioned against shaving in the morning before coming to work as this leaves the skin particularly liable to irritation. In picking the worker, those having unusually oily skin should be eliminated, in that the oily skin allows the tetryl dust to stick to it and keep a long contact. It may also increase the dermatosis problem in hastening absorption of the material. It has been noted here, however, that most cases of dermatosis have been seen in individuals having thin, reddish skin with blonde to reddish hair. The workers should be strongly advised not to treat themselves as most ointments applied to the skin increase the irritation considerably.

MERCURY FULMINATE

This material detonates completely and violently on ignition by means of a flame and easily detonates high explosives. It is therefore one of the most suitable materials for detonators. It is a heavy material usually seen to have a slight brownish yellow or grayish tint due to a small amount of impurity. It is white when pure. Mercury fulminate detonates at a temperature of about 180° C. Mercury fulminate is used only as a detonator or as an igniter of the

propellant charge. Of course, the presence of mercury immediately brings up the possibility of mercury poisoning. This is very rarely seen and if the material is properly handled it should never be seen. In common with many other explosives, however, it also causes a dermatosis. There again people who perspire easily and therefore have a wet sticky skin are more apt to show the dermatosis. It is usually seen after the individual has been at work about one week. The lesion is usually a patchy erythematous one appearing on the face and neck as well as the anterior chest. There is some irritation and itching but not nearly as severe as noted in tetryl sensitivity. There is also apt to be a conjunctivitis and some rhinitis with sneezing. The dermatosis usually progresses to a papular rash, the papules being quite red and noted on the face, neck, anterior chest and forearms. Occasionally mercury fulminate gets into a wound and causes the so-called fulminate ulcer. Such ulcerations heal very slowly and do not lend themselves kindly to treatment.

PREVENTION

The prevention is similar to that used in tetryl, that is, engineer out as much dust as possible, use protective clothes and ointments and insist on proper bathing.

LEAD AZIDE

Lead azide is a whitish to buff colored material that is also used as a detonator. Only small amounts of this material are handled; however, the possibility of lead poisoning due to absorption through the respiratory tract or through the alimentary tract must be kept in mind. Very rarely a dermatitis is seen due to lead azide. Prevention should be similar to that with other materials and careful handling will eliminate the possibility of lead poisoning.

SMOKELESS POWDER

Smokeless powder, first found in 1838 by Pelouze and developed in 1845 as a military explosive, is the principal propellant charge used today. Smokeless powder is perhaps not a good name in that this material is not entirely smokeless and it is not seen as a powder, it being used most commonly in the United States as a cylinder, the cylinders varying from 0.032 inch to 0.947 inch in diameter. Fortunately for us, smokeless powder is a rather benign actor. A few workers will complain of a slight sore throat and a cough or a mild conjunctivitis in the first few days of their exposure to the material. This is apparently due to dust and soon disappears and the worker has little further trouble. There has been in this plant one case of a severe urticaria occurring ten minutes after exposure to smokeless powder. This young lady was relieved by administration of adrenalin, sent back to work and on entering the room she again had a rash. She was removed this time and a patch test, with smokeless powder, was found positive. The young lady was permanently removed from the building containing smokeless powder and has had no more trouble. The only real trouble with smokeless powder is found in the manufacturing processes. Here the individual may occasionally be overcome by fumes of ether and alcohol. The real hazard to health is exposure to nitrous fumes and this will occur only in the event of an accident as there should be no nitrous fumes free in the manufacturing process. Nitrous fumes are extremely irritating and will produce pulmonary edema. The severe signs and symptoms of this accident will usually not make their appearance until several hours after exposure. It is extremely important that any one exposed to nitrous fumes be treated and treatment should begin immediately after the accident. The individual should be carried to the treatment room and immediately put to bed. Respiratory rates should be checked at frequent intervals and an oxygen tent prepared. In order to follow the course in an individual exposed to nitrous fumes, platelet counts should be made every hour. Should the increase in platelets be 10 to 15 per cent, the case may be expected to be of mild to moderate severity. Should a rise of 50 to 100 per cent in platelets occur then the exposure may be considered as being moderate to severe and pulmonary edema will follow. The individ-

ual having any suggestive signs of pulmonary edema should be placed in an oxygen tent and a sufficient concentration of oxygen be given to keep the individual's color a healthy pink. With more pronounced pulmonary edema venesection may be of value, provided there is no evidence of circulatory collapse. Morphine must not be given to these patients. After recovery from the immediate effects of the exposure the individual who has had pulmonary edema must be carefully observed for at least two weeks in order that a developing bronchopneumonia may be found in its early stages.

BLACK POWDER

Black powder is probably the oldest of all explosives, dating back to the very early Chinese. European history mentions this material as early as 1250 A.D. Black powder was the principal propellant until 1870. However, it has been displaced by other materials and is now used principally as an ignition charge. Since it is used in very small amounts and is not toxic no trouble has been seen at this plant.

AMMONIUM NITRATE

This material is combined with TNT to make amatol. It is combined in several percentages, most common of which is fifty-fifty. Amatol then is used as the bursting charge in most high explosive shells and bombs. Ammonium nitrate interests us mainly in that it is a considerable nuisance. It is quite irritating when it gets into open wounds and delays healing for long periods of time, sometimes resulting in difficult ulcers. This is especially unfortunate in that these employees who are handling ammonium nitrate, especially in crystallization plants, are apt to have a number of minor burns. A few cases of weakness, pallor, lowered blood pressure and a feeling of faintness have been seen in people who are exposed to heavy fumes of ammonium nitrate for a long period of time. It is believed that this is probably due to the presence of some nitrite. This is, however, only theorizing. An occasional individual is seen who exhibits some sensitivity to ammonium nitrate and he may show an urticarial rash. This may be seen on almost any part of the body. The prevention of the health hazard here is similar to other places, that is, cut down the dust and avoid fumes with the use of fume hoods or exhaust ventilators. Those individuals exhibiting unusual sensitivity must be removed from work.

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THE NEW PRESIDENT

Dr. C. C. DeGravelles will take up reins of office on the third of May, having been selected as President-Elect last year.

The new President was born on Point Pleasant Plantation near Morgan City on November 21, 1883. He attended Rugby Academy, New Orleans, and then went to Tulane University where he attained his degree of Doctor of Medicine in 1910. Immediately after his graduation he worked in St. Mary's Hospital, Patterson, Louisiana, and then moved to Morgan City where he practiced to 1934, when his second change of location carried him to New Iberia where he has been practicing medicine since that time. He is interested particularly in internal medicine.

Dr. DeGravelles has held many offices in the Parish and State Medical Societies. He is a Past President of St. Mary Parish Medical Society and the Third District Medical Society. He has been a Councilor of the Third District since 1929. He was Chairman of the Committee on Medical Economics for several years, and in 1927 he was elected Vice-President of the Louisiana State Medical Society. The New President is a man of parts. He not only has been active in organized medicine, but he has been interested and held a leading part in many other activities. He has been President of the St. Mary Parish Board of Health, and served on St. Mary Parish School Board. He was at one time President of the Peoples State and Savings Bank in Morgan City, and he is a Past President of the Rotary Club in New Iberia. He is Examining Surgeon of the Southern Pacific Railroad, and is Deputy Coroner of Iberia Parish. He is a member of the Phi Beta Phi Medical Fraternity, and a Fellow of the American College of Physicians. He served loyally and faithfully as Chairman of the Board of the Lafayette Induction Center, and is a member of the Sons of the American Revolution.

It is obvious that Dr. DeGravelles has led a busy, active, and useful life. His interest has not been confined to medicine and the practice of medicine, but he has been a tremendous force for the betterment of the people of the parishes and cities in which he has lived. The broadmindedness of the new President, his loyal service to organized medicine in the past, and his wonderful character should make him an outstanding president of the State Medical Society.

THE SHORTAGE OF PHYSICIANS

In certain areas of the country there is a marked deficiency in the number of med-

ical personnel giving services to the sick. A great deal has appeared in both medical and lay press concerning the movement of doctors from areas where population has fallen off to areas where the population is markedly increased. A plan has been worked out whereby there will be re-allocation of physicians but on the whole it has not proved to be satisfactory. The local doctors have felt, except in a few instances, that they are quite capable of taking care of the situation as it exists. They do not want newcomers to come in who might remain there after the war; the doctors, in many of the cities and towns where there has been a large influx of new people, feel that the newcomers will go back to their former homes when the defense industry activity falls off and they feel it is incumbent upon them to hold places and patients for the benefit of those doctors who have given up their practices and gone into the Army or Navy to serve their country, consequently the re-allocation of physicians has been few and far between.

Another difficulty that has arisen is the willingness of physicians to leave places where they are already well established, nor do they desire to move into those sections of the country where the population has increased to such an extent that living quarters are almost impossible to obtain, nor do they feel like binding themselves to leave that place at the end of the war.

Many of these objections are overcome by one of the plans which would call for commissioning of officers in the Public Health Service, sending them to the critical areas and promising to withdraw a man, from that area where he has been sent, at the end of the war. But again there can be no guarantee that even if a public health physician is ordered from that particular place when the war is over that he may not get out of the service and return to that locality.

Illustrative of the shift of population in Louisiana, are the figures determined for certain localities which have been deduced from the issuing of ration books. In the City of New Orleans in 1940 the census showed a population in round figures of 494,000. Ration books have been issued to 531,837 persons. East Baton Rouge shows a tremendous increase in population, from 88,000 persons it has gone up to 113,000. Calcasieu Parish likewise shows a remarkable increase in the number of people in the parish; 56,000 were living in the parish in 1940, now the figures have climbed to almost 76,000. In Rapides Parish there are 14,000 more people than there were in 1940.

In one or two of the cities of these last three parishes there have been complaints that there were too few doctors. Whether or not these complaints are justifiable is a question. Certainly Louisiana has given a very large number of civilian physicians to the armed forces and it may be that the percentage of doctors to population is in theory inadequate to take care of civilian needs. However, the doctors who have been left behind are working nobly, strenuously and under tremendous pressure. They have taken over the work of their brother physicians who have entered the services and with the exception, as has been said of a few localities, the medical situation seems to be well in hand and the civilian population is receiving adequate and good medical treatment. Of course it may come about that in the event of epidemics the local physicians may not be able to take care of the population, but fortunately the last two years have been unusually healthy years and there have been no epidemics and it is hoped there will be none such as devastated the country in 1918.

THE TREATMENT OF LEG ULCERS

Many and varied are the methods that have been advocated for the treatment of leg ulcers. Some are effective for a time and then seem to disappear into the limbo of disuse as they have not proved their worth over a long period of time. Other methods of treatment have become more or less standardized and sometimes will give good results and other times the results will be of no value. The older individual who has peripheral vascular disease is one of the group of patients whose ulcers are notori-

ously difficult to heal. Sometimes, in fact frequently, they may never be cured.

Naide*, working in the peripheral vascular section of the Robinette Foundation in Philadelphia, reports upon a group of patients with peripheral vascular disease who have been treated by a method which heretofore has not been employed. Briefly the method is application of blood taken from the antecubital vein, placed on the ulcer and then allowed to dry. The drops of blood are smeared or spread over the surface of the ulcer in a fairly thick film. This blood is then allowed to clot, taking about one-half to two hours to do this and then a dry dressing is applied. The ulcer is examined in a few days and if the clot has been broken the process is repeated. It takes from one to twenty applications of blood to bring about healing.

*Naide, Meyer: Treatment of leg ulcers with blood and concentrated plasma, Am. J. Med Sci., 205:489, 1943.

The author has modified this method of treatment by using dry plasma diluted with one-quarter of the amount of distilled water, which would be necessary to add to the plasma to make it the concentration of human plasma. He thinks this method is possibly superior to the local application of blood.

The results have been excellent. Nine of fifteen patients have been cured; ten of these ulcers were caused by arteriosclerosis and by thrombo-angiitis obliterans; five were varicose ulcers. All of the ulcers had been treated by a variety of methods and some of the ulcers had lasted as long as three and a half years. One of the immediate results of local application of blood was to reduce the inflammatory reaction and to relieve pain promptly. This is a very simple method and because of its simplicity and the success which Naide has had in the treatment of the type of ulcers which are difficult to heal, the method deserves further employment by others.

TRANSACTIONS OF ORLEANS PARISH MEDICAL SOCIETY

May 3. 64th Annual Meeting, Louisiana State Medical Society, Baton Rouge.

May 4. Eye, Ear, Nose and Throat Staff, 8 p. m.

May 5. Clinico-pathologic Conference, Charity Hospital Morgue Amphitheater, 1:30 p. m.
Mercy Hospital Staff, 8 p. m.

May 6. Clinico-pathologic Conference, Touro Infirmary, 11:15 a. m. to 12:15 p. m.
Baptist Hospital, Executive Committee, 8 p. m.

May 10. Orleans Parish Medical Society, Scientific Meeting, 8 p. m.

May 12. Clinico-pathologic Conference, Charity Hospital Morgue Amphitheater, 1:30 p. m.
Clinico-pathologic Conference, U. S. Marine Hospital, 7:30 p. m.
Touro Infirmary Staff, 8 p. m.
Women's Auxiliary, Orleans Parish Medical Society, Orleans Club, 3 p. m.

May 17. Hotel Dieu Staff, 8 p. m.
Clinico-pathologic Conference, Baptist Hospital, 8 p. m.

May 18. Charity Hospital Medical Staff, 8 p. m.

May 19. Clinico-pathologic Conference, Charity Hospital Morgue Amphitheater, 1:30 p. m.
Charity Hospital Surgical Staff, 8 p. m.
Clinico-pathologic Conference, Hotel Dieu, 8:15 p. m.

May 20. Clinico-pathologic Conference, Touro Infirmary, 11:15 a. m. to 12:15 p. m.

May 21. I. C. R. R. Hospital Staff, 12:30 p. m.

May 24. Joint Meeting, Orleans Parish Medical Society with the New Orleans Gynecological and Obstetrical Society, 8 p. m.

May 25. Baptist Hospital Staff, 8 p. m.

May 26. Clinico-pathologic Conference, Charity Hospital Morgue Amphitheater, 1:30 p. m.
French Hospital Staff, 8 p. m.
Clinico-pathologic Conference, U. S. Marine Hospital, 7:30 p. m.

May 27. Clinico-pathologic Conference, Touro Infirmary, 11:15 a. m. to 12:15 p. m.

May 28. L. S. U. Faculty Club, 8 p. m.

During the month of April the Society held one regular scientific meeting. At this meeting the

following program was presented: Some Practical Aspects of Human Blood Plasma Preparation and Therapy, by Dr. J. W. Davenport, Jr.; The Treatment of Carcinoma of the Cervix at Charity Hospital, by Drs. Manuel Garcia and Leon Menville. Dr. Davenport's paper was discussed by Drs. Daniel N. Silverman and Harry A. Davis, and Dr. Peter Graffagnino discussed Drs. Garcia and Menville's paper.

NEWS ITEMS

Dr. Joseph A. Danna recently addressed members of the Louisiana State Pharmaceutical Association, Districts One and Two. Dr. Danna spoke on blood plasma and the Army-Red Cross Blood Donor Center.

Dr. B. G. Efron was recently elected to the board of regents of the American College of Allergists.

Drs. A. I. Weil, F. R. Gomila, Sr., Val Fuchs and W. A. Wagner were recently elected to the board of directors of the Louisiana League for the Hard of Hearing for 1943.

Dr. Henry D. Ogden recently attended an informal meeting of the Southwest Allergy Forum at Dallas.

Dr. John H. Musser attended the recent meeting of the Arkansas State Medical Society at Little Rock. Dr. Musser spoke on The War and Medical Education, and on The Doctor's Heart.

Daniel J. Murphy.
Secretary.

LOUISIANA STATE MEDICAL SOCIETY NEWS

CALENDAR

PARISH AND DISTRICT MEDICAL SOCIETY MEETINGS

Society	Date	Place
East Baton Rouge	Second Wednesday of every month	Baton Rouge
Morehouse	Second Tuesday of every month	Bastrop
Orleans	Second Monday of every month	New Orleans
Ouachita	First Thursday of every month	Monroe
Rapides	First Monday of every month	Alexandria
Sabine	First Wednesday of every month	
Second District	Third Thursday of every month	

THE ANNUAL MEETING

Unfortunately, the Journal will be going through the press while the annual state meeting is being conducted in Baton Rouge. Consequently, it is not possible to print anything more than the bare announcement that the House of Delegates will meet on May 3, and that the prospects look most favorable for a splendid opening meeting.

LOUISIANA TUBERCULOSIS ASSOCIATION

The 19th Annual Meeting of the Louisiana Tuberculosis Association was held in the Jung Hotel, Wednesday, April 21 with Dr. Julius L. Wilson, presiding.

The morning program consisted of a symposium on Tuberculosis Control Among Special Groups, under the leadership of Dr. Sydney Jacobs. Dr. Chester A. Stewart spoke about College Students, Dr. S. S. Pinto on Industrial Workers; Dr. W. D. Beacham on Pregnant Women; and Dr. F. F. Brown on Negroes.

The luncheon meeting was held in the Rose Room with Mr. Monte M. Lemann presiding, at which time Lt. Colonel F. P. Rizzo spoke on Chest X-Ray Work on Selectees.

The afternoon session was presided over by Dr. B. I. Burns. The subject of the symposium in the afternoon was Methods in Community Tuberculosis Control. Dr. Edgar Hull spoke on Tuberculin Testing; Dr. R. Alec Brown discussed Survey X-ray Methods; and Mr. Jess W. Hair on Health Education as a Necessary Basis for the Program of Tuberculosis Control.

AMERICAN FEDERATION FOR CLINICAL RESEARCH

The second scientific meeting of this organization was held Wednesday, April 17 at 8 o'clock in the Hutchinson Memorial Building.

The following papers were on the program: "Studies on Early Immunization Against Pertussis" by Dr. Wallace S. Sako; "Studies of Niacin Excretion" by Dr. Grace A. Goldsmith; "In Vitro Studies of Oxidizing Agents on *Clostridium welchii*" by Dr. Maxwell F. Kepe.

The scientific meetings of the New Orleans Section of the American Federation for Clinical Research are open to all who may be interested. Papers are strictly limited to ten minutes. Discussion is to follow each paper, and is limited to a total of 20 minutes. Members, associates, and guests may participate in the discussion. Each discussor is limited to five minutes.

G. R. Meneely, M. D., Secretary.

REGIONAL MEETING OF THE COLLEGE OF PHYSICIANS

A most successful meeting of the American College of Physicians was held in New Orleans, April 16-17, under the chairmanship of Dr. Edgar Hull. This regional meeting was for the members of the college and invited guests from Arkansas, Louisiana, Mississippi, Tennessee, and Eastern Texas.

On the first day a series of clinics were held in the morning, followed by a luncheon at the Roosevelt Hotel at which time two addresses were given, one by Commander Edward L. Bortz from Philadelphia, and one by Colonel W. Lee Hart of Fort Sam Houston. The afternoon session, presided over by Dr. J. E. Knighton of Shreveport, was a series of papers by such men as Colonel Walter Bauer, Lt. Colonel Henry M. Thomas, Dr. Mark F. Boyd, Captain Bertram Groesbeck, Jr., U. S. Navy, and Dr. Chauncey D. Leake of the University of Texas Medical School. Friday evening there was a dinner for the college members and their guests, at which time addresses were given by representatives of the Army, Navy and the American Medical Association.

Saturday morning was devoted to a series of 15 minute clinics, at the end of which there was conducted a clinical pathological conference which aroused most favorable comment as being interesting and constructive.

The meeting was a great success; over 366 men registered for this day and a half session.

Participating States:

Arkansas	18
Louisiana	156
Mississippi	55
Tennessee	19
Texas	79
Other States, including Alabama, District of Columbia, Florida, Georgia, Illinois, Massachusetts, New York, North Carolina, Oklahoma, Pennsylvania and Virginia	39
	366

	Fellows	Associates	Guests	Total
M. C., U. S. Army	38	24	137	199
M. C., U. S. Navy	5	1	11	17
U. S. P. H. Service	4	.....	7	11
Total Service Drs.	47	25	155	227
Civilian Doctors	87	19	33	139
Totals	134	44	188	366

LOUISIANA STATE UNIVERSITY SCHOOL OF MEDICINE

Dr. George McCoy, Director of the Department of Preventive Medicine at the Louisiana State University School of Medicine, has left the city to attend the meeting of the District of Columbia Basic Science Board which will be held at Washington, D. C., on April 22. Dr. McCoy will also attend the meeting of the United States Pharmacopoeia Society in New York on April 23 and April 24. Dr. McCoy will also attend the meeting of the National Foundation for Infantile Paralysis, which will be held in New York on May 12.

The Department of Surgery staff will be represented at the American Surgical Association meeting in Cincinnati, Ohio, on May 13 and 14, by Dr. Urban Maes, Director of the Department of Surgery, and Dr. James D. Rives, Clinical Professor of Surgery.

Dr. Rupert Arnell was guest speaker at a joint meeting of the Rapides Parish Medical Society and the Staff Conference of the Huey P. Long State Hospital at Alexandria on April 6, 1943. The subject of Dr. Arnell's presentation was "The Edemas Complicating Pregnancy."

TUBERCULOSIS PROGRAM

The following will be put into effect at the opening of the academic session beginning March 11, 1943.

1. Detection

a. Mantoux test with old tuberculin 1:1000 required for all students on matriculation. Test to be repeated semi-annually on all negative reactors.

b. X-ray of chest required on every student at time of admission to medical school.

c. Usual clinical and laboratory studies on all suspected cases of tuberculosis.

2. Disposition of Tuberculous Cases

a. Cases with positive sputa to be excluded from school. Disposition of cases with negative sputa to be left to judgment of the Student Health Service.

b. Criteria for re-admission of students who have tuberculosis.

1. Negative sputum.
2. Opinion of the Director of the Student Health Service that the student has sufficiently recovered to perform the usual duties of a medical student.
3. Students re-admitted to school may remain enrolled only if their sputa remain persistently negative, irrespective of other findings.

Negative sputum is defined as two consecutive 6-day specimens of sputum negative for tubercle bacilli by concentration technic.

A persistently negative sputum is defined as a single specimen of sputum examined according to the above technic every 3 months during the school session and found negative.

c. The treatment of cases who are advised to leave school shall not be a responsibility of the Student Health Service.

3. Protection and Prevention

a. All persons who attend necropsies on tuberculous cases shall be required to wear masks.

b. Patients with tuberculosis or who are suspected of having tuberculosis shall be required to wear masks when they are being examined by students, interns, residents, or staff members.

c. Students are required to wear masks when examining sputa of patients suspected of having tuberculosis.

d. All clinical departments and the Department of Pathology and Bacteriology shall give special attention to the instruction of students regarding the precautions to be taken in the handling of tuberculous material and in the examination of tuberculous patients.

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NEWS ITEMS

The regular monthly meeting of the medical division of the Charity Hospital visiting staff was held on Tuesday, April 20 in the auditorium of the institution. The following was the program: "Case Presentation of Unusual Thyroid Tumors" by Dr. C. Magee; "Case Presentation of Systemic Granuloma Inguinale" by Dr. L. C. Paggi; "Case Presentation of Disseminated Lupus Erythematosis" by Dr. L. Rausch; "Case of Ascites" by Dr. J. Fleet.

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The E. R. Squibb & Sons firm has had a star added to the Army-Navy "E" Pennant which it is their privilege to fly over their offices and laboratories. The star means that the "E" award has been renewed for another six months.

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An intensive course in electrocardiography will be conducted in the Cardiovascular Department of the Michael Reese Hospital, Chicago, under the direction of Dr. Louis N. Katz. This course will be conducted August 16-28. The fee for the course is $100.00.

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Mr. J. W. Reily, Vice-President of the New Orleans' United Community and War Chest, has been appointed a director of the National War Fund, Inc. Among others nationally known in business and civic life who are serving on the board are: Captain Edward D. Rickenbacker, Bernard M. Baruch, Marshall Field, Edsel Ford, Thomas W. Lamont, Mrs. Dwight W. Morrow, John D. Rockefeller, Jr., and William Allen White.

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The National Foundation for Infantile Paralysis announces that a five-year grant of $150,000 has been given to the Yale University School of Medicine for the establishment of the Yale Poliomyelitis Study Unit. These studies will be made under the direction of Dr. John R. Paul, professor of Preventive Medicine of this institution. The Yale Poliomyelitis Commission was established in 1931. It will now undergo reorganization and enlargement of its activities.

REGISTRATION OF N. O. GRADUATE MEDICAL ASSEMBLY

REGISTRATION OF LA. PHYSICIANS EXCLUDING NEW ORLEANS

Zelma Alden, Monroe
U. J. Arreteig, Church Point
John S. Bailey, Church Point
William E. Barker, Jr., Plaquemine
Felix Boizelle, Baton Rouge
W. F. Brooks, Vinton
Harold S. Cohn, Alexandria
Nelson A. Cox, Napoleonville
A. A. Culpepper, Alexandria
H. J. Dauterive, New Iberia
P. A. Donaldson, Reserve
M. H. Foster, Alexandria
S. F. Fraser, Many
W. R. Garrett, Springfield
Carroll F. Gelbke, Gretna
Charles F. Gelbke, Gretna
P. R. Gilmer, Shreveport
Ben Goldsmith, Lake Charles
U. S. Hargrove, Baton Rouge
S. R. Henry, Crowley
Rufus Jackson, Baton Rouge
John N. Jones, Bastrop
Daniel W. Kelly, Oak Grove
Ralph Lampert, Alexandria
B. B. Lane, Jr., Zachary
Thomas Latiolais, Kaplan
Percy H. LeBlanc, Donaldsonville
M. L. Levy, Jonesville
Charles W. Lewis, Eunice
A. W. Martin, Bogalusa
Claude A. Martin, Welsh
Dawson T. Martin, Donaldsonville
Keith Mason, Shreveport
Morgan W. Matthews, Shreveport
W. R. Mathews, Shreveport
Dorothy R. Mattingly, Baton Rouge
E. C. Melton, Plaquemine
F. H. Metz, Morgan City
J. W. McLaurin, Baton Rouge
T. C. Paulsen, Baton Rouge
E. J. Petitjean, Opelousas
Kirby A. Roy, Mansura
Charles L. Saint, Elizabeth
Philip J. Saleeby, Algiers
Reuben Sanford Roy, Natchitoches
E. A. Schexnayder, Donaldsonville
William M. Scott, Shreveport
Walter D. Simmons, Covington
W. W. Smith, Caddo
G. M. Snellings, Monroe
Leo Saporito, Kaplan
Rhodes J. Spedale, Plaquemine
Thomas E. Strain, Shreveport
Jesse F. Tanner, Bernice
A. D. Tisdale, Monroe
A. S. Tomb, Shreveport
T. B. Tooke, Jr., Shreveport
L. Roland Young, Covington
C. A. Weiss, Baton Rouge

H. Aubrey White, Alexandria.
Fred C. Winn, Crowley
S. George Wolff, Shreveport
J. L. Woodall, Colfax

RECOMMENDATIONS FOR A VENEREAL DISEASE CONTROL PROGRAM IN INDUSTRY

Advisory Committee on the Control of Venereal Diseases
Otis L. Anderson, Chairman

In order to assemble current authoritative information and to formulate basic principles applicable to a program of venereal disease control in industry, the Surgeon General has appointed an Advisory Committee to the United States Public Health Service. This Committee has outlined the objective of such a program as:

A. Medical and Public Health:

1. To find and refer for proper medical management all cases of venereal diseases among workers in industry.
2. To establish equitable policies for the employment of applicants and continuation of services of employees who have venereal diseases.
3. To coordinate the community and industrial venereal disease control programs.

B. Employee:

1. To improve the physical condition of employees.
2. To reduce the number of work days lost through illness or injury.
3. To provide job placement.
4. To prolong and increase the earning power of employees.

C. Employer:

1. To reduce compensation costs.
2. To lessen work interruptions and labor turnover.
3. To enhance production by increasing the efficiency of workers.
4. To minimize personnel problems.

In order to assure agreement on all phases of fundamental policy, the committee recommends that certain agencies be consulted in carrying out this program: the State labor department, industrial commission or similar department of State government; the appropriate committee of the State medical society; the association representing employers; the labor organizations; appropriate voluntary health and welfare associations.

Responsibility for the administration of the program should be shared by the industrial hygiene and venereal disease divisions of the State health department. The program should not be inaugurated without a complete educational program. The employee should be convinced that adequate treatment protects both his health and his ability to earn a living, and the employer that not all cases of venereal disease are infections, through an educational program before venereal disease control measures are introduced.

In order that the control program may be effective, preemployment examinations should be mandatory for all workers. Laboratory tests for syphilis and gonorrhea should be made a part of periodic, reemployment or "return from illness" physical examinations which are the policy of the industry. The interval between examinations should under no circumstances be more than three years.

It is of utmost importance that the results of the medical examination be considered confidential between the worker and the medical staff. Information should be furnished to others only with the consent of the individual concerned or, failing this, on legal advice. The medical staff should make proper recommendations to the management as to the physical fitness of the employee for work. When the usual clinical record is kept in an open file, venereal disease forms should be filed in the medical departments for the use of the medical staff only.

There is no reason for denying employment to an applicant or for discharging an employee because an examination has revealed evidence of syphilis or gonorrhea, provided:

1. That the employee agrees to place himself under competent medical management;
2. That, if the disease is in the infectious stage, employment should be delayed or interrupted until such time as a noninfectious state is established through treatment and open lesions are healed;
3. That when syphilis exists in the latent stage, employment should not be delayed or interrupted;
4. That employment may be deferred or denied when the individual is an industrial hazard;
5. That occupational readjustments of employees be made of individuals developing manifestations;
6. That workers with syphilis in any of its stages be excluded from areas where there is exposure to chemicals which may produce toxic reactions, and those having cardiosvascular syphilis or neurosyphilis should not be exposed to physiologic stresses;
7. That workers with gonorrhea should be allowed to work only under special medical observation during the administration of sulfonamide drugs.

The applicant or the employee whose examinations reveal evidence of a venereal disease should be called to the industrial physician's office for a conference. He should be instructed as to the nature of the disease which he has in order that he may cooperate intelligently with the requirements of the program. He should be referred to a reputable source for medical attention and be furnished with a letter directed to his physician stating the results of the examination and what is expected of the employee as to regularity of treatment if he is to be employed. The industrial physician should receive a record of treatment at

about monthly intervals. The names of individuals who have neglected or refused treatment should be turned over to the health department for appropriate action in bringing them back to treatment.

The plant physician making a tentative diagnosis of communicable syphilis or gonorrhea should without delay acquaint the appropriate health authority with the facts.

CONFERENCE ON WARTIME VENEREAL DISEASE CONTROL

This meeting was held in the State Capitol of Baton Rouge on Friday, April 2. Mr. Jess W. Hair, Director of Public Health Education of the Louisiana State Board of Health presided. On the program were Governor Sam H. Jones, Dr. David E. Brown, President of the Louisiana State Board of Health, Mr. Bascom Johnson of the American Social Hygiene Association, Dr. John M. Whitney of the City Board of Health, and representatives in the Army, Navy, and the Air Corps, as well as many others.

Dr. David E. Brown, president of the Louisiana State Board of Health, explained in the following remarks the purposes of the meeting:

It is indeed a pleasure at this time for me to have this opportunity of participating in this meeting. This is the first state-wide conference that has ever been called in Louisiana for the purpose of discussing the venereal diseases. I want to say that Louisiana is one of the first states in the union to put on a state-wide educational program for the purpose of stamping out venereal disease. I feel we have taken the lead when it comes to cooperation with the various agencies, the Army, the Navy and United States Public Health Service in carrying out a program that has been deemed so important by the leaders of our nation.

The subject of venereal disease is one that has been neglected. In fact up until recently if anyone in Louisiana suggested holding a public meeting for the purpose of discussing social diseases in the open, he would have been criticized as vulgar and indecent. It was only discussed in offices of physicians behind closed doors. We have lived to see the time when people of the state and nation have realized the importance of these diseases. As the Governor has already said, it is not only a medical and public health problem, but also an economic one. This subject has never been attacked in various isolated sections of the country before this time. During World War I Louisiana Legislature took a forward step along this line and passed a law attempting to control this disease. We are still operating under that law.

Louisiana is fifth from top in incidence of venereal disease. There are five other states in the south that have more cases than does Louisiana. It is important that we take a forward step for the reason that within the bounds of this state we have many thousands of soldiers, not only sons of people of our state but from every state in the union. As result of these large numbers of soldiers being congregated in our camps, we have an enormous number of prostitutes coming from all over to collect around the camps and these women are disseminating diseases to these young men who must go to war to win our battles.

Louisiana was the first state in the union to establish a detention hospital for apprehending and treating prostitutes. We have had this institution which is located at Leesville near Camp Polk, in operation for one year. There have been 75 to 100 girls confined in the institution every day. We are able at this time to discharge those patients as cured within five to six weeks. I have been asked from many sections if we expect to carry on these institutions and clinics and I will say that we do expect to carry on. We hope that we can give sufficient treatment to render the prostitutes noninfectious and when we do that we have done a great thing toward stopping the spread of these diseases. There is no reason why we should not stamp out these diseases because they are preventable and we have the remedy which is a positive cure.

During my period of medical practice, I have seen many changes in the treating of venereal disease. In medical school twenty years ago, a case of syphilis would be given treatment by the clinician over a period of two to three years and the cure was not definite. However, that is not true today; with cooperation from the patient in carrying out instructions, the time of complete cure is greatly shortened (6-8 weeks). With a disease that is preventable, with a positive cure, and facilities for treatment, there is no reason why we should not eventually stamp out the disease. As the Governor told you, there are two to three sides to the question—not only what it means to the public from a medical and public health standpoint, but its pertinency to the tax payer of the country. If hospitals and asylums are visited, patients are found there with late manifestations of various types of venereal diseases. I do not intend to give you a lot of figures, as several persons here will give you such information on the incidence of the disease. I want to say the State Board of health is cooperating with the Public Health Service, the Army and the Navy in the programs which it is considered will be best to stamp out and control this disease.

At the conclusion of the meeting a Committee on Recommendations proposed a resolution which was unanimously adopted. This resolution read as follows:

Be it Resolved, that there be organized in each parish of Louisiana a committee on "Wartime Control of Venereal Disease" consisting of:

Parish Health Unit Director, President of Local Medical Society, Mayor, Sheriff, City and District Attorneys, Chief of Police, President of Police Jury and Judges.

UNITED STATES PUBLIC HEALTH SERVICE

Asst. Surgeon Neil Callahan has been relieved from duty at New Orleans and has been sent to the Coast Guard Academy in New London, Conn.

Asst. Surgeon Grady M. Wallace has been ordered from Baltimore to report to the Marine Hospital in New Orleans.

Asst. Surgeon George Fein has been relieved from duty in Hot Springs, Ark., and ordered to report to the State Health Department in Leesville, La.

P. A. Surgeon Robert L. Zobel has been relieved from duty in Baton Rouge and ordered to the State Health Office in Nashville, Tenn.

P. A. Surgeon George C. Van Dyke has been relieved from duty in Puerto Rico to report to the Marine Hospital, New Orleans.

Asst. Surgeon Charles W. Fluke has been sent from New Orleans to Galveston, Texas.

INFECTIOUS DISEASES IN LOUISIANA

The morbidity report of the Louisiana State Board of Health shows that for the week ending March 20 measles led all other reportable diseases with 232 cases listed for this particular week. Syphilis has usually always been the most frequently reported of the reportable diseases, but the State Department of Health is now reporting the venereal diseases only once a month. Other diseases occurring in numbers greater than 10 include 42 cases of mumps, 13 of influenza and of meningococcus meningitis, 12 of chickenpox, 11 of scarlet fever, and 10 of tuberculosis. Nine cases of meningococcus meningitis were reported from Rapides Parish and arose in the army camps thereabouts. It was unusual that in this week a case of smallpox was reported from Lafayette Parish. The measles epidemic still continued, as did a mild epidemic of mumps in the week which closed March 27. There were 197 of the former diseases reported from Lafayette Parish. The measles epidemic still continued, as did a mild epidemic of mumps in the week which closed March 27. There were 197 of the former diseases reported and 66 of the latter. There were 24 instances of chickenpox listed, 18 of pulmonary tuberculosis, 15 of influenza, and 10 of scarlet fever. A great percentage of measles cases were reported from military sources. Five cases of meningitis were reported this week from these sources. There were also listed 46 cases of unclassified pneumonia. The report ending April 3 includes the total cases of venereal diseases reported during the month of March. There were 697 cases of syphilis, 1,038 of gonorrhea, and 127 of chancroid. Other diseases include 282 of measles, 92 of mumps, 41 of cancer, 37 of pulmonary tuberculosis, 19 of lymphogranuloma venereum, 21 of lobar pneumonia, 18 of chickenpox, and 16 of scarlet fever. There were also listed 78 cases of unclassified pneumonia, which means of course that these were so-called virus pneumonias which are extremely prevalent this winter. There were nine cases of meningococcus meningitis also reported, with no other relatively rare disease. For the week which ended April 10 there were listed 170 cases of measles, 32 of mumps, 28 of pulmonary tuberculosis, 24 of chickenpox, 16 of influenza, 15 of meningococcus meningitis, and 13 of cancer. There were also reported 50 cases of unclassified pneumonia. The meningitis cases again were largely in the army camps, 13 of the 15 cases coming from military sources.

HEALTH OF NEW ORLEANS

The Bureau of the Census, Department of Commerce, reports that for the week ending February 27 there were reported 187 deaths in the city, divided 127 white, 60 all others. This was an increase in the total number of deaths in the previous week when only 170 were listed, and quite a considerable increase over the three year average corresponding week, figures for which are 157. The following week, which closed March 6, there were 176 deaths in the city, divided 112 white, and 64 colored, with 12 deaths in children under one year of age. There was quite a sharp increase in the week which was concluded on March 13. Of the 195 deaths, 113 were in the white and 82 in the colored population. Fifteen of the deaths were in children, divided approximately equally between the two races. For the last week terminating March 20 for which we have figures, there were 52 less deaths in the city than in the previous week. Of the 143, 97 were in the white and 46 were in the colored race, with 12 of them being in children under one year of age. The first 11 weeks of the year have not been as healthy as the corresponding weeks in 1942, there being 177 more deaths in the city than in 1942. It must be taken into consideration, however, that there has been a population increase in the city of New Orleans quite considerable in number.

DR. JOHN B. ELLIOTT
(1870-1943)

One of New Orleans' outstanding physicians died on April 14, in Birmingham. Dr. John B. Elliott was born in Georgia in 1870, graduated from Sewanee in 1891, and entering Tulane Medical School, graduated in medicine in 1894. Dr. Elliott was for eleven years head of the Department of Medicine of Tulane. He succeeded his father, Dr. John B. Elliott in this position. Following Dr. Elliott's resignation he was in a short time ap-

pointed to the Board of Administrators of Tulane University, and served on the Board until he reached the age of 65.

During the last war he was in charge of the Tulane University Base Hospital Number 24, and spent two years on active duty.

Dr. Elliott was an outstanding physician. He was loved and respected by his patients, and in the later years of his life when he confined his work almost entirely to office and consultation work the patients came to him from all over the Far South for his advice and instructions. He was always a student of medicine, and regularly he would attend important medical meetings. It was said of him that he would spend two or three days alone in the Scientific Exhibits of the American Medical Association. He always kept up in medicine and knew everything that was fresh and up-to-date.

In recognition of the many years of service to Tulane, Dr. Elliott had conferred upon him the honorary degree of Doctor of Laws in 1937.

Dr. Elliott was incapacitated for several years prior to his death. At the time of his death he was staying with his son in Birmingham, Alabama.

DR. STANLEY EDWARD GRAHAM
(1888-1943)

Dr. Stanley Edward Graham of St. Francisville, was born in East Baton Rouge Parish, October 31, 1888, and died March 25, 1943, at the age of fifty-four years of coronary thrombosis. He was graduated from the University of Tennessee in 1910, and was a member of the State and American Medical Societies. He practiced medicine in Louisiana from 1910 to 1943.

CAPTAIN SAMUEL A. BARKOFF
(1915-1943)

Captain Samuel A. Barkoff was killed on April 10, 1943, as a result of the crashing of an army bomber on which he was flying. This young officer was well known to the Charity Hospital Staff. He graduated from Louisiana State University Medical School in 1937, and then interned and served as a house officer in that institution.

WOMAN'S AUXILIARY

Reports from Auxiliaries have been conspicuous by their absence this month, Mrs. A. G. McHenry of Ouachita being the only one to send in news.

Twenty-three members of the Ouachita Auxiliary attended a luncheon meeting at Hotel St. Francis. Donation of a sum of money to the Women's Field Army for Control of Cancer was voted. Dr. A. D. Tisdale, the guest speaker, was introduced by Mrs. R. W. O'Donnell, the president, and brought an important message to the group.

Orleans Parish members are busy this month with their annual campaign for periodic health examination. A number are working tirelessly in the drive for memberships in the Women's Field Army for the Control of Cancer. In addition to the usual war work that is regularly carried on several are busy selling War Bonds. Mrs. George Taquino, president-elect of the State Auxiliary, and Mrs. H. B. Gessner, a past president of the same group, are both proving themselves to be excellent saleswomen of bonds.

Before this issue of the Journal is in the hands of readers the Annual meeting will be history. Though a large attendance is not expected it is hoped that each auxiliary will be represented. Mrs. Clarence B. Erickson has done a splendid job of administering the affairs of the State Auxiliary during a most difficult period and she deserves congratulations on her success.

The June number of the Journal will carry an account of the Baton Rouge meeting, so those of you who are unable to attend, read the Journal and see what you have missed.

Mrs. James W. Warren,
Chairman of Press and Publicity.

BOOK REVIEWS

Blood Substitutes and Blood Transfusion: Edited by Stuart Mudd and William Thalhuner. Charles C. Thomas, Springfield, Illinois, 1942. Pp. 403. Price, $5.00.

This volume is essentially a symposium, monograph of contributions presented by various authors at the annual meeting of the American Human Serum Association, held in Cleveland on June 2 and 3, 1941. The arrangement of the communications have been slightly altered to permit a more logical approach and to include the results of more recent studies, i. e., up to the spring of 1942.

The book is divided into eight sections, the first of which comprises four chapters dealing with etiology and mechanisms of secondary shock. In the second section are grouped thirteen chapters on the various methods of preservations of plasma and serum by desiccation and by freezing. The third section, consisting of six chapters, is devoted to a discussion of hemoglobin, serum, albumin, and casein digest as blood substitutes. The significance of these various blood substitutes is the main topic of the fourth section, which includes five chapters. The fifth section, comprising five chapters, is concerned with the use of whole blood. Particularly considered in these chapters are such factors as storage, transportation, and administration and the significance of isoagglutinins and

certain blood group specific substances. The sixth section includes four chapters which deal with the experimental and clinical experiences on the therapeutic value of preserved liquid, dried, and concentrated serum and plasma. The seventh section is essentially a summation of the subject, in which the author attempts to consider "in the light" of these contributions, "what principal conclusions may be drawn, what current problems need solution, what prospects open toward the future." The last section, an appendix, is a one-page letter from the Lynphile Cryochem Company, in which is presented their commendable policy of granting royalty free licenses to universities, hospitals, and governmental agencies "for research and experimentation, and for production on a non-profit basis of products derived from human beings, such as serum and plasma."

Actually each chapter is written in the style of an article as it might appear in a current journal. Accordingly, each chapter or article represents the experiences and views of the various authors on their respective subjects. No attempt is made to edit, integrate, or unify the subject matter and the articles are grouped into sections according to the phases considered. Herein lie the advantages and the disadvantages of this volume. The convenience of such authoritative contributions on this timely vital subject in a readily available source is obvious. On the other hand, such a method of presentation permits expression of varied and sometimes conflicting opinions and the reader must decide for himself the best methods and procedures. This is inevitable in view of the current intensive investigations the various phases of this subject are undergoing. The volume clearly reflects this feature and provides the reader with a fairly comprehensive consideration of the most recent developments in blood substitutes.

MICHAEL DEBAKEY, M. D.

Military Surgical Manuals II; Ophthalmology and Otolaryngology: Prepared by a Sub-Committee on Ophthalmology and a Sub-Committee on Otolaryngology. Philadelphia, W. B. Saunders Company, 1942. Pp. 331. Price $4.00.

This interesting and instructive little volume of 300 pages was prepared by outstanding authors serving under the National Research Council. Its purpose is to simplify the more frequent problems and procedures which confront those responsible for the efficient care of eyes, ears, noses, and throats in the military service.

The ophthalmic section of about 150 pages, is exceptionally well conceived and illustrated. The chapters on functional testing and examinations by Dr. Post, present tersely expressed fundamentals. Acute inflammation by Dr. Gradle, is reasonably complete and well dramatized. Corneal ulcers could have been described in greater detail. Virus infections, which were relatively frequent in World War I, are not specifically mentioned. The chapter on injuries, including chemical burns, by Dr. Gifford, should be of great help to ophthalmologists facing actual war casualties for the first time. Its summary adds materially. The last, and perhaps best contribution to this section are the well illustrated chapters on local anesthesia and surgical procedures by Dr. Benedict.

The contribution on Otolaryngology is an effort to present in a brief and compact form the principles and essentials of traumatic and war surgery as related to the ear, nose and throat. The various chapters in this section have been prepared and written by prominent specialists who are thoroughly familiar with their respective assignments. The subject matter is well presented, but in many instances the sections are all too brief, leaving much to be desired. However, it is an excellent little book chuck full of otolaryngologic information which should be most useful to the military surgeon.

CHARLES A. BAHN, M. D.
AND
FRANCIS E. LEJEUNE, M. D.

New and Nonofficial Remedies, 1942: Containing descriptions of the articles which stand accepted by the Council on Pharmacy and Chemistry of the American Medical Association on January 1, 1942. Chicago, American Medical Association. Pp. 671. Price, $1.50.

The new yearly edition of this valuable book has just been published. In general appearance it adhers to the standards of the past. However, the contents of the book have undergone some radical rearrangements. The classification of products heretofore chemical in nature is now largely according to therapeutic use. The typographic style has also undergone some alterations.

The comparative recent introduction of the sulfonamides and the marked increase in the number of vitamin preparations indicates just how well worth while this book can be to the doctor, because under each of these two headings is an authoritative discussion of the sulfonamides, their uses, and likewise of the vitamins. Very complete revisions have been made also of the sections on gonadotropic substances, aluminum compounds, the liver and stomach preparations, and various endocrine preparations. There have been added a few new drugs to those that were already accepted by the Council. These include acetyl-beta-methylcholine, adrenal cortex, aluminum hydoxide gel, normal human serum and plasma, cyclopropane, amylcaine hydrochloride and pernoston sodium.

It is rather difficult to see how a practicing physician can do without this volume. It not only contains the names of the drugs, their therapeutic uses and their pharmocologic preparations, but also at the beginning of each main section there is an excellent discussion of the drugs there listed both from the pharmacologic and therapeutic point of view.

J. H. MUSSER, M. D.

Mind and Its Disorders: By James N. Brawner, M. D. Atlanta, Walter W. Brown Pub. Co., 1942. Pp. 228. Price, $3.50.

In view of the ever widening range of complexities of our present day existence with constantly increasing mental and physical strain, the aim of Doctor Brawner's book—to equip general physicians to handle mental illness—is a highly creditable and an important one. Even though psychiatry is closely related to internal medicine its mastery requires long, highly specialized training and experience. And it is my thought that one may not safely go beyond certain limits in sacrificing the "obscurity and technicality" of many texts on mental and nervous disorders for the sake of simplicity.

It interests and intrigues me to consider the idea of naming abnormal mental reactions with words which describe etymologically the conditions for which they may be used. Even so, I wonder if this will really simplify matters. And if "hebephrenia" is restricted to apply only to mental disorders occurring at the age of puberty, a new name will have to be found for the hebephrenic type of schizophrenia. "Dementia precox" is, I think properly considered to be a type of mental disorder in which the dementia is precocious in the illness rather than one in which the illness is precocious in the afflicted individual. I see nothing to be gained by substituting "simple deteriorative" and "disorderly" as names for the simple and hebephrenic types of schizophrenia. I think the descriptions of these types, as given in the Statistical Manual for Mental Hospitals, are quite simple and eminently satisfactory. Many neuropathologists believe that demyelization of axonic processes, found in the brains of schizophrenics, is due to preservatives used rather than to effects of structural changes. I fail to see how it will help matters for the general practitioner to learn to differentiate between five types of paranoia which, according to modern psychiatric conceptions, is a rare and somewhat difficult illness to diagnose.

Even if there are other criticisms, after all, I fail to find Doctor Brawner's book as simple and as free from technicalities as he might wish it to be. However, the sections on Alcoholism and Morphinism are excellent.

Undoubtedly Doctor Brawner's manual will achieve quite a readership among those for whom it is intended. And, if they learn and practically apply much of its contents, they will acquire considerable helpful psychiatric knowledge and inspiration.

C. P. MAY, M. D.

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PUBLICATIONS RECEIVED

W. B. Saunders Company, Philadelphia and London: Gynecology with a section on Female Urology, by Lawrence R. Wharton, Ph. B., M. D. Neurosurgery and Thoracic Surgery, Prepared and Edited by the Subcommittees on Neurosurgery and Thoracic Surgery of the Committee on Surgery of the Division of Medical Sciences of the National Research Council. Manual of Industrial Hygiene and Medical Service in War Industries, Prepared by the Division of Industrial Hygiene, National Institute of Health, United States Public Health Service, William M. Gafafer, D. Sc., Editor.

The C. V. Mosby Company, St. Louis: Operative Oral Surgery, by Leo Winter, D. D. S., M. D., F. A. C. D., F. A. C. S., Sc. D. (Hon.), LL. D., second edition. Endoscopic Surgery, by Roger W. Barnes, M. S., M. D., F. A. C. S.

The Williams & Wilkins Company, Baltimore: Acute Infections of the Mediastinum, by Harold Neuhof, M. D., D. S., F. A. C. S., and Edward E. Jemerin, M. D., D. S., F. A. C. S.

Alfred A. Knopf, New York: Man in Structure and Function, by Fritz Kahn, M. D., Volumes I and II, translated from the German and edited by George Rosen, M. D.

Paul B. Hoeber Inc., New York and London: Ovarian Tumors, by Samuel H. Geist, M. D.

Grune & Stratton, New York: The Inner Ear, including Otoneurology, Otosurgery, and Problems in Modern Warfare, by Joseph Fischer, M. D. and Louis E. Wolfson, M. D.

Charles C. Thomas, Springfield, Ill. and Baltimore: Neurology, by Roy Grinker, M. D., third edition. Blood Groups and Transfusions, by Alexander S. Wiener, A. M., M. D. Transurethal Prostatectomy, by Reed M. Nesbit, M. D., F. A. C. S. Clinical Roentgenology of the Cardiovascular System, by Hugo Roesler, M. D., F. A. C. P., second edition.

Lea & Febiger, Philadelphia: A Text-book of Pathology, by William Boyd, M. D., LL. D., M. R. C. P., Ed., F. R. C. P., Lond., Dipl., Psych., F. R. S. C., fourth edition.

Funk & Wagnalls Company, New York and London: Flying Men and Medicine, by E. Osmun Barr, M. D.

The University of Chicago Press, Chicago, Illinois: Food Poisoning, by G. M. Dack, Ph. D., M. D.

The Sherwood Press, Cleveland, Ohio: Care and Preservation of Beauty for the Individual Woman, by Charles Lazar, M. D.

Philosophical Library, Inc., New York: Dictionary of Bio-Chemistry.

New York Academy of Sciences, New York: Annals of the New York Academy of Sciences, Volume XLIII, Art. 6, pages 253-426, February 26, 1943, Protein Hormones of the Body.

France Forever, New York: Problems de Medecine de Guerre, by Daniel Cordier. Le Probleme du Cancer, by Charles Oberling.